TRAFALGAR ENGINEERING

FUNCTIONAL SERVICING REPORT

Water, Sanitary, and Stormwater Management

DRAFT PLAN OF SUBDIVISION

ARGO NEYAGAWA CORPORATION
TOWN OF OAKVILLE

OUR FILE: 1805

PREPARED FOR ARGO DEVELOPMENT CORPORATION

DECEMBER 2023

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REVISION HISTORY

DATE	REVISION	SUBMISSION
December 2023	1	Issued for Official Plan Amendment, Draft Plan of Subdivision, and Zoning Bylaw Amendment

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1.0 INTRODUCTION

1.1 Scope of Functional Servicing Report

This report has been prepared in support of the Official Plan Amendment (OPA), Draft Plan of Subdivision, and Zoning Bylaw Amendment(ZBA) for the Argo Neyagawa property, hereafter referred to as the Subject Lands or the site, located at the north-west corner of Neyagawa Boulevard and Burnhamthorpe Road West (Part of Concession 2 NDS, Part of Lot 20). This report discusses how the proposed development can be serviced by the existing and future infrastructure for water, wastewater, and stormwater as well as demonstrates how the development meets municipal criteria for stormwater management, site grading, and erosion and sediment control.

The information provided in this report is preliminary. Detailed engineering designs and drawings will need to be undertaken as part of the subdivision development and site plan designs.

This report has been prepared for the exclusive use of Argo Development Corporation and cannot be used by other parties without the prior written approval of Trafalgar Engineering Ltd.

1.2 Previous Studies, Reports and Documents

Information provided in this report is based on our general knowledge of the area as well as information/drawings obtained from the Town of Oakville and the Region of Halton. Additionally, the following documents have been reviewed in support of this application:

- North Oakville Creeks Sub-watershed Study, Town of Oakville, August 2006 (NOCSS)
- North Oakville Creeks Sub-watershed Study Addendum, Town of Oakville, September 2007 (NOCSS Amendment)
- North Oakville East Secondary Plan – Area Servicing Plan, MMM Group, April 2011 (ASP)
- New North Oakville Transportation Corridor and Crossing of Sixteen Mile Creek Class Environmental Assessment Study, Regional Municipality of Halton, March 2010 (WHP EA)
- Environmental Implementation Report and Functional Servicing Study, East Sixteen Mile Creek Tributary Subcatchment ES6-West and the Davis Minardi North Lands, North Oakville East, Stonybrook Consulting Inc. et al., June 2015 (Davis Minardi EIR/FSS)
- North Oakville Environmental Implementation Report and Functional Servicing Study Terms of Reference, Town of Oakville, August 2, 2007 (Terms of Reference)
- North Oakville Trails Plan, Town of Oakville, May 2013 (Trails Plan)

- Stormwater Management Planning and Guidelines Manual, Ministry of Environment, March 2003 (MOE Manual)
- Development Engineering Procedures & Guidelines Manual, Town of Oakville, 2016 (Town's Manual)
- Water and Wastewater Linear Design Manual, Regional Municipality of Halton, April 2015 (Region's Manual)

1.3 Site Location and Description

The 11.28 ha subject lands are bounded by Highway 407 to the north, Neyagawa Boulevard to the east, Burnhamthorpe Road West (Future William Halton Parkway) to the south, and Fourth Line to the west. The holdout property of 501 Burnhamthorpe Road West is excluded from the subject lands but are considered in the overall design. The subject lands are located within the ES6-West sub-watershed as defined in the NOCSS and confirmed through the EIR/FSS Addendum.

The site was formerly used for agricultural purposes and there are no current structures on the property. The site generally slopes from north to south. A copy of the Topographic Survey completed by R-PE Surveying is provided in Appendix 'A'.

1.4 Proposed Development

The proposed development concept features a mix of medium to high density residential and a potential for mixed use. The draft plan contains 5 development blocks, two internal municipal roads, Street 'A' and Street 'B', as well as a stormwater management block.

The blocks will be accessed and serviced by internal municipal roads. An L-shaped 17.0 m north-south road (Street 'A') intersects Burnhamthorpe Road West west of Neyagawa Boulevard and ties into Fourth Line to the north. A 19.0 m east-west road (Street 'B') bisects the property and connects to Fourth Line at the west and Neyagawa Boulevard at the east. There is a dedicated 0.93 ha stormwater management block in the southwest corner of the development. A block is provided at the northern portion of the site for the potential future 407 Transitway and a block for the required 14.0 m MTO setback. A major trail block is also dedicated along the boundary of the developable ARGO lands and 407 Transitway. A copy of the Draft Plan is provided in Appendix 'A'.

2.0 MUNICIPAL WATER

2.1 Municipal Water Pressure Zones

The Subject Lands are located within the Zone 4 district of Halton's water distribution system. Through correspondence with Regional staff, it was identified that Zone 4 is currently undergoing

a zone realignment. Currently the Subject Lands are within subzone M4L. In the future, the Subject Lands will transition to a TWL of 250m. Refer to material provided in Appendix 'B' for interim and future zone boundaries as provided by the Region.

2.2 Municipal Water Infrastructure

2.2.1 Existing

Based on record drawings from Halton Region, there is an existing 1200 mm diameter CPP (Concrete Pressure Pipe) trunk watermain along Neyagawa Boulevard and Burnhamthorpe Road West. An existing 400 mm diameter PVC watermain branches off the trunk watermain and reduces to an existing 300 mm diameter PVC watermain along Burnhamthorpe Road West within the Zone 4 pressure boundary. There are two existing fire hydrants on Burnhamthorpe Road West adjacent to the subject lands that are serviced off the 300 mm watermain. There is also a 300 mm diameter PVC watermain on Fourth Line south of Burnhamthorpe Road.

A flow test was undertaken (November 23, 2023) on the 400 mm diameter watermain Neyagawa Boulevard using the hydrant at the southeast corner of Burnhamthorpe Road West and Neyagawa Boulevard. A flow test was also undertaken (November 23, 2023) on the 300 mm diameter watermain on Burnhamthorpe Road West using the hydrant south of Burnhamthorpe Road West and east of Fourth Line. Refer to Drawing 1 in Appendix 'E' for existing hydrant locations. The results of the flow tests are included in Appendix 'B' and are summarized as follows:

Table 1: 400 mm diameter Watermain on Neyagawa Boulevard

Static Pressure	93 psig
Flow 1,061 usgpm (67 L/s)	91 psig
Flow 1,744 usgpm (110 L/s)	89 psig
Theoretical Flow 7,402 usgpm (466 L/s)	residual 20 psig
Estimated Max. Daily Plus Fire Service Pressure	87 psig

Table 2: 300 mm diameter Watermain on Burnhamthorpe Road West

Static Pressure	54 psig
Flow 1,034 usgpm (65 L/s)	52 psig
Flow 1,678 usgpm (106 L/s)	50 psig
Theoretical Flow 4,775 usgpm (301 L/s)	residual 20 psig
Estimated Max. Daily Plus Fire Service Pressure	47 psig

2.2.1 Proposed Municipal Water Demands

All proposed services must be in accordance with the Ontario Building Code, Town of Oakville, and Region of Halton standards and requirements. A copy of the Conceptual Water Servicing Plan is included in Appendix 'E' and should be read in conjunction with this report.

Using the development area and Region of Halton design criteria (135 persons per ha for medium-density residential and 285 persons per ha for high-density residential), the domestic water usage is estimated and summarized below (see Appendix 'B' for supporting calculations). The residential population is estimated to 1303 persons.

Table 3: Estimated Water Demands per Block

	Area (ha)	Equivalent Population Density (pp/ha)	Equivalent Population (persons)	Average Daily Flow (m^3/day)
Block 1	1.60	135	216	41
Block 2	1.64	285	467	89
Block 3	1.74	135	235	45
Block 4	1.70	135	230	44
Block 5	1.15	135	155	30
TOTAL	**7.83**		**1303**	**249**

The proposed mixed-use block will require the largest fire flow and has been used in the design of the watermain. The fire flow is estimated for demand purposes only using the Fire Underwriter's Survey methodology and should be confirmed by a sprinkler consultant at the building permit stage. The resulting fire flow is 7000 L/min. Supporting calculations can be found in Appendix 'B'.

The estimated water demands are summarized in the table below.

Table 4: Estimated Water Demands per Region of Halton Design Criteria (L/min)

Average Daily Demand	249
Minimum Hourly Demand	249
Maximum Hourly Demand	788
Maximum Daily Demand	560
Estimated Fire Demand (FUS 1999)	7000
Maximum Daily Plus Fire Demand	7560

2.2.2 Proposed Municipal Water Infrastructure

The proposed municipal watermains will connect to the existing 300 mm diameter watermain on Burnhamthorpe Road West in two locations. A 300 mm diameter watermain will be extended north along Fourth Line and connect through the proposed watermain at Street 'A' to form a 'looped' system. A proposed 300 mm diameter watermain will run along both Street 'A' and Street 'B' (refer to the Preliminary Water Servicing Plan for watermain layout). Hydrants will be provided along the roadway per the Region's standards and the spacing will not exceed 90 m.

The development of the residential blocks will provide detailed water servicing design based on the type of development. The proposed servicing must meet Town of Oakville, Halton Region, and Building Code standards.

3.0 MUNICIPAL WASTEWATER

Sanitary drainage for the subject lands will follow the concepts established in the ASP Update Report prepared by Trafalgar Engineering, submitted to the Region in March 2023 in support of this report to which the Region provided clearance.

The ASP included the subject lands in the tributary of the Neyagawa sewer as employment lands. As demonstrated in the Argo Neyagawa EIRFSS, there is sufficient capacity in this sewer with the increased population. The change in land use results in a peak flow increase of approximately 7 L/s (or roughly 1 cm increase in flow depth) which is considered nominal. The supporting design sheets and ASP Update have been included in Appendix 'C' for reference.

3.1 Existing Municipal Wastewater Infrastructure

Based on record drawings from Halton Region, there is an existing 450 mm diameter PVC sanitary sewer on Burnhamthorpe Road West. The 450 mm diameter PVC sanitary sewer continues down Neyagawa Boulevard, becomes an existing 525 mm diameter PVC sewer before discharging at the Dundas Street Pumping Station.

3.2 Proposed Municipal Wastewater

All proposed services must be in accordance with the Ontario Building Code, Town of Oakville, and Region of Halton standards and requirements. A copy of the Conceptual Sanitary Servicing Plan is included in Appendix 'E' and should be read in conjunction with this report.

3.2.1 Proposed Wastewater Demands

Using the development area and Region of Halton design criteria for medium density residential (townhouse, 135 persons per hectare) and high-rise residential (apartments exceeding six-storeys, 285 persons per hectare), the estimated proposed sanitary discharge is determined with 338 persons and 275 m^3/cap. day (see Appendix 'C' for supporting calculations) and summarized in the table below.

Table 5: Estimated Proposed Wastewater Flow per Block (L/s)

	Area (ha)	Equivalent Population Density (per/ha)	Equivalent Population (persons)	Average Daily Dry Weather Flow (L/s)
Block 1	1.60	135	216	0.7
Block 2	1.64	285	467	1.5
Block 3	1.74	135	235	0.7
Block 4	1.70	135	230	0.7
Block 5	1.15	135	155	0.5
TOTAL	**7.83**		**1303**	**4.1**

Table 6: Estimated Proposed Wastewater Flow (L/s)

Average Daily Dry Weather Flow	4.1
Modified Harmon Peaking Factor	3.72
Infiltration Allowance (0.286 L/s-ha)	2.6
Peak Flow	18.1

3.2.2 Proposed Linear Infrastructure

A 200 mm diameter PVC sanitary sewer will run along the length of Street 'B' and Street 'A' and outlet to the existing sanitary manhole on Burnhamthorpe Road West. Refer to Conceptual Sanitary Servicing Plan in Appendix 'E' for the sanitary sewer layout.

The sanitary sewers for the subject site have been designed to convey the expected peak flows of the site. The sanitary sewer design sheet in Appendix 'C' demonstrates that the proposed 200 mm diameter PVC sanitary sewer has sufficient capacity. The respective sanitary boundaries can be seen on the Conceptual Sanitary Servicing Plan in Appendix 'E'.

Approval of the sanitary sewer will be sought as part of the detailed engineering submissions.

4.0 DRAINAGE

The proposed storm drainage and stormwater management design for the subject lands accounts for the holdout property as part of the overall development. When the property comes forward with a development application, analysis should be completed to ensure conformity with the assumptions and preliminary design prepared as part of this report.

4.1 Existing Storm Drainage

The subject lands generally slope from north to south via sheet flow towards Burnhamthorpe Road. There is no existing stormwater infrastructure within the subject lands. Runoff is conveyed south under Burnhamthorpe Road West through two culverts. One culvert directs drainage south through the King's Christian Collegiate lands, and the other culvert directs runoff south to the roadside ditch of Fourth Line. Both outlets ultimately drain to the SMA-6 reach. The existing drainage patterns were reviewed as part of the EIR/FSS Addendum. The Existing Storm Drainage Pattern Figure 5.2 from the EIR/FSS is provided in Appendix 'D' for reference.

4.2 Proposed Storm Drainage

4.2.1 Minor System

Storm servicing is required for the subject site in order to capture and convey site flows to the proposed stormwater management (SWM) pond. The proposed storm sewers are designed to convey the storm runoff from the subject lands for the 5-year storm event, per Town of Oakville design criteria. A preliminary storm sewer design sheet is provided in Appendix 'D'.

4.2.2 Major System

The road network is designed to convey runoff from events larger than the 5 year overland to a low point on Street 'A' and through an overland flow easement within Block 1. The overland flow easement will convey major storm flows to the future SWM pond and has been sized for the 100-year peak flow to ensure safe conveyance in an emergency event. Refer to the Conceptual Storm Servicing Plan in Appendix 'E' for a layout of the storm sewers and respective drainage areas. Refer to the Conceptual Grading Plan in Appendix 'E' for the proposed overland flow route.

5.0 STORMWATER MANAGEMENT

The stormwater management criteria for the development have been outlined in NOCSS and the NOCSS Addendum, as well as applicable SWM guidelines from the MECP.

5.1 Peak Flow Control

Post-development peak flows for the 2-year to 100-year storm events, including the Regional Storm, are to be controlled to the target unit flow rates ($m^3/s/ha$) as outlined in the NOCSS 'Mediation Item: Flow Rates/Hydrology'. These target flow rates are based on maintaining existing flow rates to Sixteen Mile Creek.

Table 7, below, summarizes the target unit flow rates from the NOCSS Addendum.

Table 7: Target Unit Flow Rates from NOCSS Addendum

Design Event	Target Flow ($m^3/s/ha$)
2-year	0.004
5-year	0.007
10-year	0.009
25-year	0.012
50-year	0.014
100-year	0.016
Regional	0.044

The David-Minardi EIR/FSS and the Argo Neyagawa EIR/FSS Addendum established that Regional Controls are not required for the subject lands.

To control stormwater runoff from the site, a wet pond facility is proposed. The proposed urban pond will include an active storage component to provide quantity control (peak flow) for events up to and including the 100-year storm and designed to meet the erosion control requirements. The pond will discharge to the proposed extension of the Fourth Line storm sewer and eventually outlet to reach SMA-6.

The proposed pond will accept drainage from the subject lands totaling 10.2 ha with an average imperviousness of 85%. Table 8 below, summarizes the release rate and storage requirements.

Table 8: SWM Facility Release Rates and Storage Requirements

Component	Unit Release Rate[(1)] ($m^3/s/ha$)	Target Release Rate[(2)] (m^3/s)	Simulated Inflow (m^3/s)	Used Storage (m^3)	Simulated Outflow (m^3/s)
Extended Detention [3)]	N/A	N/A	0.639	857	0.011
2-yr/24hr Chicago	0.004	0.041	1.727	2 518	0.021
5-yr/24hr Chicago	0.007	0.071	2.563	3 310	0.053
10-yr/24hr Chicago	0.009	0.092	3.128	3 918	0.080
25-yr/24hr Chicago	0.012	0.122	3.883	4 739	0.116
50-yr/24hr Chicago	0.014	0.142	4.416	5 280	0.139
100-yr/24 Chicago	0.016	0.163	4.937	5 880	0.163
Regional [(4)]	0.044	N/A	N/A	N/A	N/A

Post-development flow rates are calculated using the Town of Oakville IDF curves, curve numbers of CN=98 and CN=74 (>75% Grass Cover, HSG C), for impervious and pervious areas respectively.

In the estimation of the curve number, the following assumptions were made:

- The townhouse lots were assumed to be 85% impervious, per Town of Oakville Standards.
- All Right of Ways were assumed to be 100% impervious.
- Any landscaping in the courtyard of the mixed use blocks, or rooftop amenity space were not considered.

These assumptions are conservative and can be refined as detailed design progresses. A conservative value of post-development runoff coefficient ensures adequate sizing of the SWM pond and stormwater infrastructure during this preliminary design stage.

Preliminary modeling results are included in Appendix 'D'. The preliminary stage-storage discharge curve is also provided in Appendix 'D'.

Based on the preliminary modelling and design, a pond block of 0.93 ha is required to meet the MECP, Town of Oakville, and EIR/FSS requirements. The preliminary design of the wet pond incorporates retaining walls along the north and east sides of the pond, at the edge of the 7:1 slope zone. There is a break in the retaining wall at the north end of the forebay to facilitate maintenance access. This preliminary design approach falls within the Town of Oakville's criteria for an urban pond (permitting retaining walls within the pond block) as the pond is adjacent to higher density residential. At the detailed design stage, the retaining walls will be further detailed and stamped by a professional structural and/or geotechnical engineer.

5.2 Topographic Depression/Hydrologic Features

The EIR/FSS identified two Hydrologic Features B within the subject lands. If the hydrologic features are removed, their storage volumes need to be incorporated into the stormwater management pond.

Based on the proposed draft plan, both Hydrologic Features B will be removed and filled in to accommodate the building of the proposed roads and level off the development blocks. Detailed topographic mapping completed of the Subject Lands encompassing the Hydrologic Features B, including a bathymetric survey of the northern hydrologic feature. As noted in the EIR/FSS, only the northern Hydrologic Features B is a natural feature and, as such, only the storage associated with this feature needs to be accommodated in the SWM facility. Hydrologic Feature B North is estimated to have a storage volume of 1,050 cu.m.

The proposed SWM pond has an active storage volume of 5,900 cu.m. which is greater than the storage volume of the northern Hydrologic Features B, therefore providing sufficient volume to replicate the feature.

5.3 Erosion Control

The erosion threshold assessment completed as part of the EIR/FSS for the ES6-West Sub-catchment, established a recommended erosion threshold of 0.048 m^3/s. However, it was noted that the sub-catchments in the ES6-West catchment control runoff on a 'best-efforts' basis, whereby the minimum orifice size is set at the Town's guideline of 75 mm (or greater where larger catchments permit).

The proposed design of the stormwater management pond is such that the 25 mm rainfall event (extended detention) is released through a 115 mm orifice over a duration of 27 hr. The peak outflow is 0.011 m^3/s. Additionally the peak release rate of the 2-year storm event is 0.021 m^3/s. The outflow from both events is below the recommended erosion threshold and represent 90% of the average annual rainfall events. Due to the size of the catchment, reducing the orifice size to 75 mm to control all storm events is not practically feasible.

5.4 Quality Control

The EIR/FSS water quality parameters for the subject lands are to provide Enhanced Level of water quality protection (80% TSS removal).

The proposed stormwater management pond has been designed as a wet pond facility with a permanent pool and extended detention as per MECP Stormwater Management Guidelines (2003).

Table 9: Summary of Water Quality Volumes

	Unit Requirement (m^3/ha)	Required Volume (m^3)	Provided Volume (m^3)	Depth (m)
Permanent Pool	210	2142	2876	1.2
Extended Detention	40	408	1907	0.23

Minimum forebay sizing and dispersion length as required by the MECP are met. Preliminary calculations are provided in Appendix 'D'. At the detailed design stage, a Stormwater Management Implementation Report will be prepared to provide full details of the stormwater management facility.

5.5 Infiltration

As identified through the EIR/FSS, LID techniques to minimize urban development impacts on the water balance are to be incorporated into the development design. The relatively low hydraulic conductivity of the native soils limits the use of infiltration techniques, however a number of other techniques can be used to increase the potential for post-development infiltration. These techniques include:

- Increased topsoil depths on residential lots of street boulevards
- Disconnected downspouts to splash onto pervious areas
- Private rain barrels and cisterns

The techniques above will be implemented where possible within the development. Further details will be provided at detailed design.

5.6 Groundwater

Town current engineering standards do not permit the discharge of groundwater to their system. As discussed in the terms of reference meeting with Town staff, the Town may accept the discharge of groundwater provided the system is designed to accommodate the groundwater flows.

Based on the preliminary hydrogeological report completed by DS Consultants, groundwater elevations may intersect with any proposed deep underground structures. Groundwater management such as slab on grade foundations, and/or raft/waterproofed foundations will need to be considered at detailed design. Based on the Hydrogeological Report, the short-term construction plus storm water estimated maximum dewatering rate is 77,400 L/day (0.89 L/s).

This is a conservative estimate of flow and can be accommodated in the design of the municipal sewers.

The proposed stormwater management pond should be designed in consultation with the geotechnical consultant to consider potential groundwater impacts. Additional design considerations such as a clay liner may be required.

Further assessment will be completed as the design progresses to ensure infrastructure is sized appropriately (i.e. storm sewers, swm pond) for groundwater quantity and quality.

6.0 SITE GRADING

The grading of the subject site has been prepared based on the existing property line grades, the transitway grades to the north, and maintaining a defined overland flow route to the stormwater management pond. The grading has focused on capturing the runoff from the entire developable area (ie. no uncontrolled flows). The grading details along the perimeter of the blocks have considered the Town of Oakville typical road cross-sections and standard boulevard sloping.

A copy of the Conceptual Grading Plan is provided in Appendix 'E' and should be read in conjunction with this report.

7.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment controls must be installed prior to the commencement of any construction. The erosion and sediment control devices should follow the 'Erosion and Sediment Control Guidelines for Urban Construction' as set out by the Greater Golden Horseshoe Conservation Authority. Erosion and sediment control measures may be implemented as follows:

- Double wrapped catch basins: The proposed storm sewer catch basins and catch basin manholes located within the subject and adjacent municipal roads shall be double wrapped in a woven geotextile material. Woven geotextile material is to be replaced periodically when accumulated sediments interfere with drainage. The abutting streets should be monitored and if required, swept to mitigate the accumulation of tracked material on the roads on a routine basis in keeping with good construction housekeeping practices.
- Gravel Access Pad: A gravel access (mud) mat will be installed at the entrance to the construction zone to prevent mud tracking from the site to the municipal roads.
- Silt Fencing: Silt fence will be installed along the property line to intercept sheet flow.

- Cut-off swales: Cut-off swales can be used at key locations to intercept sheet flow and direct runoff towards the temporary sediment pond or alternative suitable outlet
- Temporary Sediment Pond: Because of the size of the site, a temporary sediment pond is recommended. Sediment laden runoff can be directed to the sediment pond and slowly released to allow for suspended sediment to collect at the bottom.

A copy of the Conceptual Erosion and Sediment Control Plan is provided in Appendix 'E' and should be read in conjunction with this report.

A detailed erosion and sediment control plan and phasing plan (if applicable) will be developed at the detailed engineering submission. The detailed design should follow the Erosion and Sediment Control Guide for Urban Construction (2019), and Town of Oakville guidelines.

8.0 CONCLUSION

The information presented in this Functional Servicing Report demonstrates that the proposed development can be serviced by the existing and future adjacent infrastructure for water, wastewater, stormwater and can meet the NOCSS, Town of Oakville, and Halton Region criteria.

The following is a summary of the report findings:

- There is existing municipal water infrastructure adjacent to the site that can readily service the site. The proposed average daily water demand for the site is 249 L/min with an estimated maximum daily plus fire demand of 7560 L/min.
- There is existing wastewater infrastructure adjacent to the site that can readily service the site. The estimated peak wastewater flow based on Region of Halton criteria is 18.1 L/s for the entire site.
- Stormwater quantity controls will be provided by controlling post development peak flows to the target release rates as specified in the NOCSS Addendum. Storage will be provided in a proposed wet urban pond in the southwest corner of the development. A designed outlet structure will control release rates to the target rates. The pond will discharge to the future extension of the existing Fourth Line storm sewer.
- The proposed wet pond is designed as an urban pond per Town of Oakville criteria with retaining walls along the north and east sides.
- The two Hydrologic Features 'B' will be removed as a result of the proposed development. The feature's storage volume is accommodated within the active storage of the proposed wet pond.

- The water quality requirement of 80% TSS removal is achieved through the sediment forebay of the proposed stormwater management wet pond for the subject lands.
- Infiltration techniques such as increased topsoil depth, disconnected downspouts, and private rain barrels and cisterns should be explored at detailed design to minimize impacts on the water balance.
- Grading of the site is designed to ensure runoff from the 100-year event is captured, and there is an emergency overland flow route directing runoff towards the proposed wet pond.
- Erosion and sediment controls will be implemented during construction in accordance with the Erosion and Sediment Control Guide for Urban Construction and Town of Oakville guidelines

Based on the above, we support the Official Plan Amendment, Draft Plan, and Zoning By-Law Amendment for the proposed development from a civil engineering perspective.

PREPARED BY TRAFALGAR ENGINEERING LTD.

Andy Prejs, EIT, MASc
Intermediate Designer

Nicole Sylvester, P.Eng.
Project Manager

APPENDIX ‘A’

FIELD OBSERVATIONS:

THE FIELD OBSERVATIONS REPRESENTED ON THIS PLAN WERE COMPLETED ON THE 19 th DAY OF AUGUST, 2022

LEGEND

BX	DENOTES BELL BOX
BXB	DENOTES BELL BOX
BXH	DENOTES HYDRO BOX
CB	DENOTES CATCH BASIN
CONC	DENOTES CONCRETE
INV	DENOTES CULVERT INVERT ELEVATION
OBV	DENOTES CULVERT OBVERT ELEVATION
P.I.N.	DENOTES PROPERTY IDENTIFIER NUMBER
LS	DENOTES LAMP STANDARD
TS	DENOTES TRAFFIC SIGN
UP	DENOTES UTILITY POLE
HW	DENOTES HANDWELL
MH	DENOTES MANHOLE
MHSA	DENOTES MANHOLE SANITARY
MHST	DENOTES MANHOLE STORM
WV	DENOTES WATER VALVE
-W-	DENOTES OVERHEAD WIRE
Ø	DENOTES DIAMETER
x	DENOTES FENCE LINE
HYDRANT	DENOTES HYDRANT
	DENOTES GUY WIRE ANCHOR

NOTES

A) THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED EXCEPT FOR THE PURPOSE IN THE TITLE BLOCK.

B) THIS SKETCH IS PROTECTED BY COPYRIGHT ©.

C) THIS SKETCH IS AN ORIGINAL IF EMBOSSED BY THE SURVEYOR'S SEAL

D) BOUNDARY LINE-WORK TAKEN FROM R-PE CAD FILE 22-064R01.

BENCHMARK NOTE

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MINISTRY OF TRANSPORTATION ONTARIO FIRST-ORDER VERTICAL BENCH MARK NUMBER 00819818114 HAVING AN ORTHOMETRIC ELEVATION OF 188.594 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928:1978).

STEEL ROD WITH BRASS CAP BENCH MARK ON NORTH SIDE OF BURNHAMTHORPE RD, 138.7 M EAST OF THE JCT OF BURNHAMTHORPE RD AND SIXTH LINE RD IN OAKVILLE, AND 9.2 M NORTH OF CENTRELINE OF BURNHAMTHORPE RD. BENCH MARK IS SET 1.1 M SOUTH OF NORTH RIGHT-OF-WAY FENCE OF BURNHAMTHORPE RD AND IS MARKED BY A STEEL MARKER 46 CM EAST OF BENCH MARK.

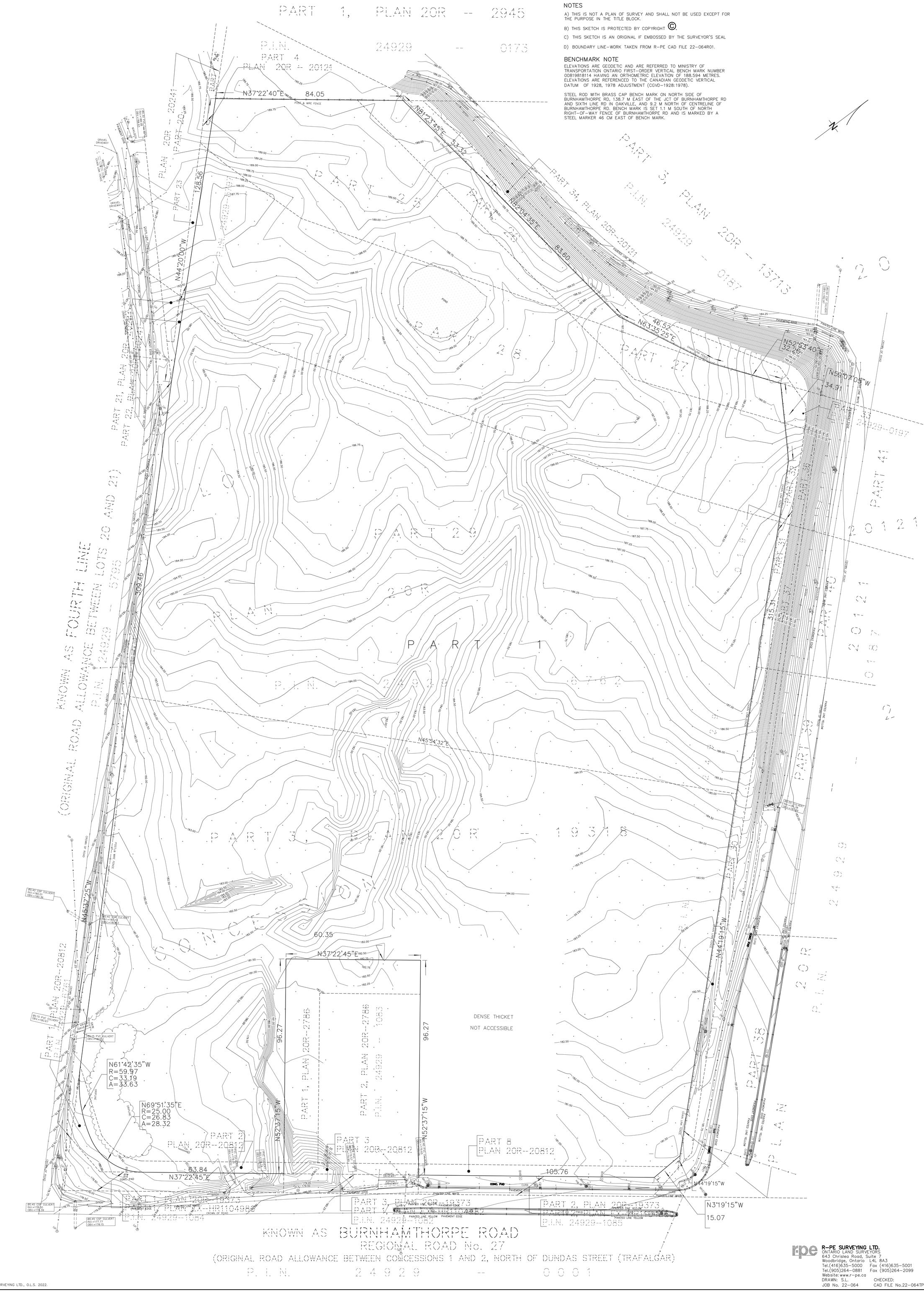
SKETCH SHOWING ELEVATIONS FOR ENGINEER'S USE

SCALE 1:500

10m 5m 0m 10m 20m 30m 40 metres

R-PE SURVEYING LTD., O.L.S.

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.



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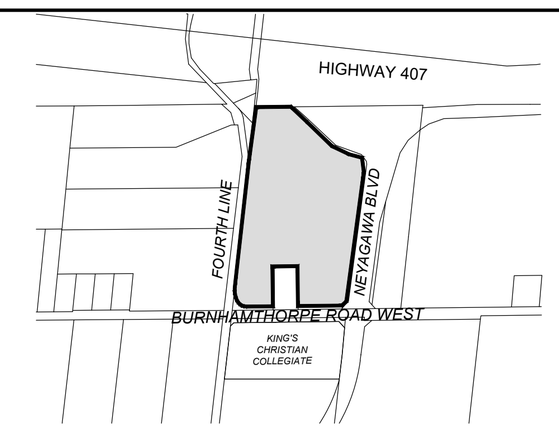
Tel.(905)264-0881 Fax (905)264-2099
Website: www.r-pe.ca
DRAWN: S.L. CHECKED:
JOB No. 22-064 CAD FILE No.22-064TP01

DRAFT PLAN OF SUBDIVISION
24T-

PART OF LOT 20
CONCESSION 2, NORTH OF DUNDAS STREET

GEOGRAPHIC TOWNSHIP OF TRAFALGAR
NOW IN THE
TOWN OF OAKVILLE
REGIONAL MUNICIPALITY OF HALTON



KEY MAP — Subject Lands

OWNER'S AUTHORIZATION

I HEREBY AUTHORIZE KORSIAK URBAN PLANNING TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE TOWN OF OAKVILLE FOR APPROVAL.

SIGNED _____ DATE _____
Scott Bland

Argo Neyagawa Corporation
4900 Palladium Way, Suite 105, Burlington, Ontario L7M 0W7

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE CORRECTLY AND ACCURATELY SHOWN.

SIGNED R. Den Broeder DATE December 19, 2023
Ross DenBroeder, Ontario Land Surveyor

R-PE Surveying LTD.
ONTARIO LAND SURVEYORS
643 CHRISLEA ROAD, SUITE 7, WOODBRIDGE, ONTARIO L4L 8A3
Tel.(416)635-5000 Fax (416)635-5001

ADDITIONAL INFORMATION

(UNDER SECTION 51 (17) OF THE PLANNING ACT)

A) SHOWN ON PLAN
B) SHOWN ON PLAN
C) SHOWN ON PLAN
D) SHOWN ON PLAN
E) SHOWN ON PLAN
F) SHOWN ON PLAN
G) SHOWN ON PLAN
H) MUNICIPAL AND PIPED WATER TO BE PROVIDED
I) CLAY LOAM
J) SHOWN ON PLAN
K) SANITARY AND STORM SEWERS TO BE PROVIDED
L) SHOWN ON PLAN

LAND USE SCHEDULE

Land Use	Lots/Blocks	Block Total	Area (ha)
Medium Density Residential Condominium Block	1,3-5	4	5.61
Mixed Use Block	2	1	1.64
Stormwater Management Pond	6	1	0.93
Trail	7	1	0.12
Future MTO Setback	8	1	0.42
Future Transitway	9	1	1.24
17m ROW (458 m)			0.79
19m ROW (258 m)			0.52
35m ROW			0.01
Totals	1-9	9	11.28

DATE	REVISION	DWG	BY
Dec 19, 2023	Original Submission	A	SP
Dec 8, 2023	Draft for Review	A	SP

NOTES:

- Pavement illustration is diagrammatic
- Connector or Avenue to Arterial daylight triangle = 15m
- All other daylight triangles = 3.5m

ARGO DEVELOPMENT CORP

SCALE 1:1000 | December 19, 2023 | A
DRAWN BY: SP | CHECKED BY: KC

KORSIAK Urban Planning
206-277 Lakeshore Road East
Oakville, Ontario L6J 1H9
T: 905-257-0227
info@korsiak.com

S:\Korsiak & Company\ARGO\Neyagawa\Draft Plan\2023-12\Argo Neyagawa - Draft Plan - Dec 19 23_sp_w topo.dwg

APPENDIX 'B'

Nicole Sylvester

From: MacKenzie, Ronald <Ronald.MacKenzie@halton.ca>
Sent: Wednesday, November 22, 2023 10:53 AM
To: Nicole Sylvester
Cc: Hilder, Alex; James Nelson
Subject: RE: Argo Neyagawa - Water Pressure (1805)
Attachments: Existing Pressure Zones - May 2020.pdf; Future Pressure Zones - May 2020.pdf; Interim Pressure Zone - May 2020.pdf

Hi Nicole,

The general parameters for the Zone Realignment program are as follows:

Interim Phase:
The interim phase is reliant on the operation of the new Zone 4 (Ashgrove) Reservoir and new PRVs in north Oakville. At the moment, the Reservoir is being commissioned and the PRVs are in place, so this phase will happen fairly soon. The Ashgrove Reservoir will operate at a TWL of ~250 m (maybe a little lower when it first begins to operate). Once the reservoir is operational it will service all of existing Milton Zone M4L and a small portion of Oakville Zone O4. These two zones (M4L and O4) are currently (existing state) at a TWL of 236 m. In the interim phase, M4L will transfer completely to TWL 250 m. The northern portion of O4 will transfer to TWL 250 m and the remainder of O4 will remain at 236 m.

Future Phase:
The future phase is reliant on the completion of 6 infrastructure projects that are part of the 2020 Allocation Program. These projects include upgrades to pump stations, linear infrastructure work and the installation of additional PRVs. These projects are currently scheduled for completion sometime in the ~2025-ish timeframe.
Here are the key changes in the future phase:

1) Milton Zone M5L (TWL 267 m) will shrink in size. Much of M5L will be transferred to TWL 250 m, including the Halton Hills/401 Corridor lands.
2) Oakville Zone O4 (TWL 236 m) will transition to a TWL of 223.5 m.
3) The southeast corner of Milton (along Tremaine Road) will transition from TWL 250 m to TWL 223.5 m.
4) Oakville O3 (TWL 198 m) boundary will change.

We are also attaching the zone realignment maps for your reference that show the limits of the proposed boundary changes for existing, interim and future/ultimate conditions.

Thanks,

Ron

From: Nicole Sylvester <nsylvester@trafalgareng.com>
Sent: Thursday, November 16, 2023 3:53 PM
To: MacKenzie, Ronald <Ronald.MacKenzie@halton.ca>
Cc: Hilder, Alex <Alex.Hilder@halton.ca>; James Nelson <jnelson@trafalgareng.com>
Subject: RE: Argo Neyagawa - Water Pressure (1805)

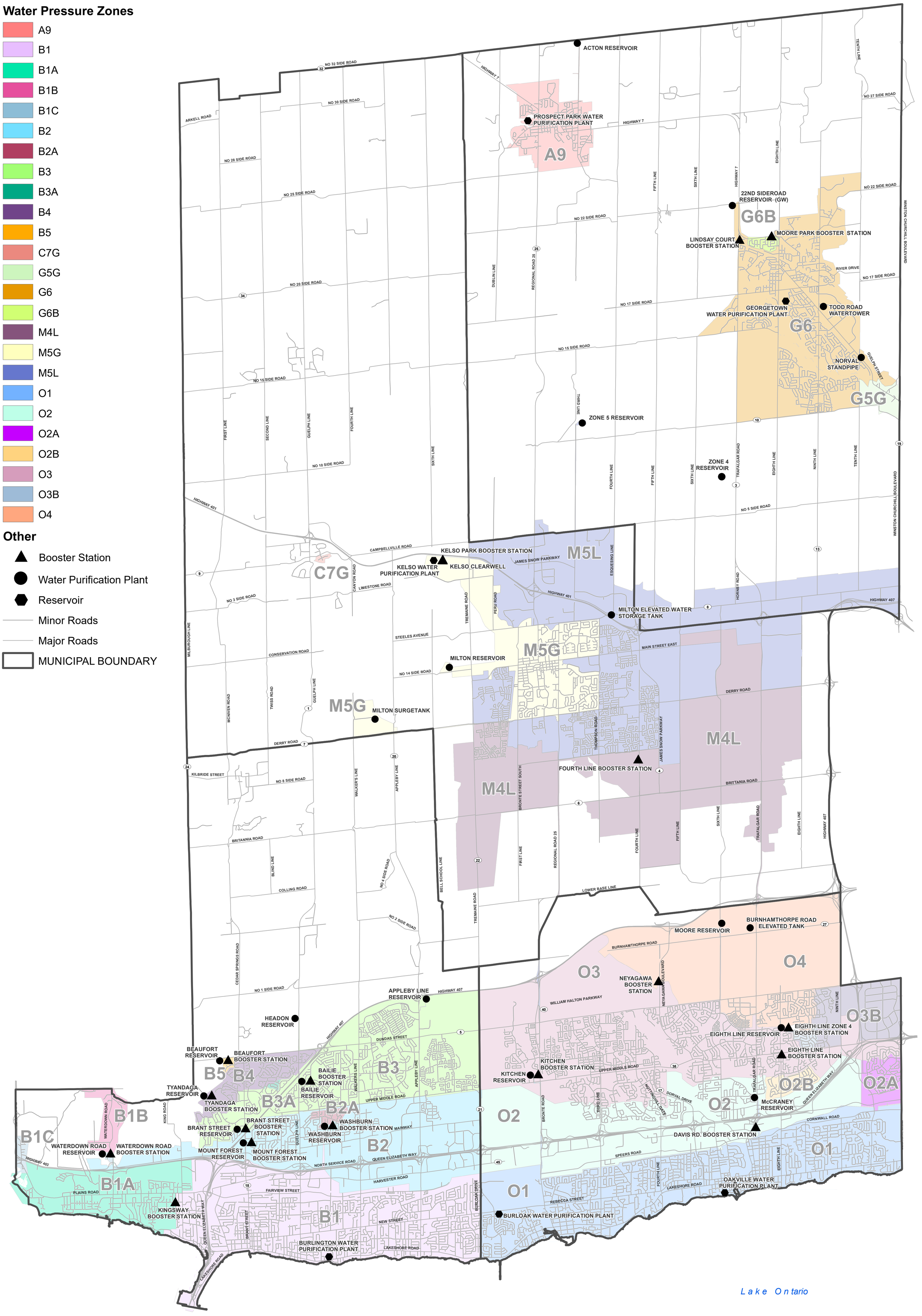
Legend

Water Pressure Zones

- A9
- B1
- B1A
- B1B
- B1C
- B2
- B2A
- B3
- B3A
- B4
- B5
- C7G
- G5G
- G6
- G6B
- M4L
- M5G
- M5L
- O1
- O2
- O2A
- O2B
- O3
- O3B
- O4

Other

- Booster Station
- Water Purification Plant
- Reservoir
- Minor Roads
- Major Roads
- MUNICIPAL BOUNDARY



HALTON REGION

Existing Water Pressure Zones

Note that the pressure zone boundaries displayed in this map are approximate and subject to change.

0 0.75 1.5 3 4.5 6 Km

Public Work, May 2020

R:\Infrastructure Management\Infrastructure Data\Projects_Requests\Internal\Claudia\MapRequest\PressureZoneMap

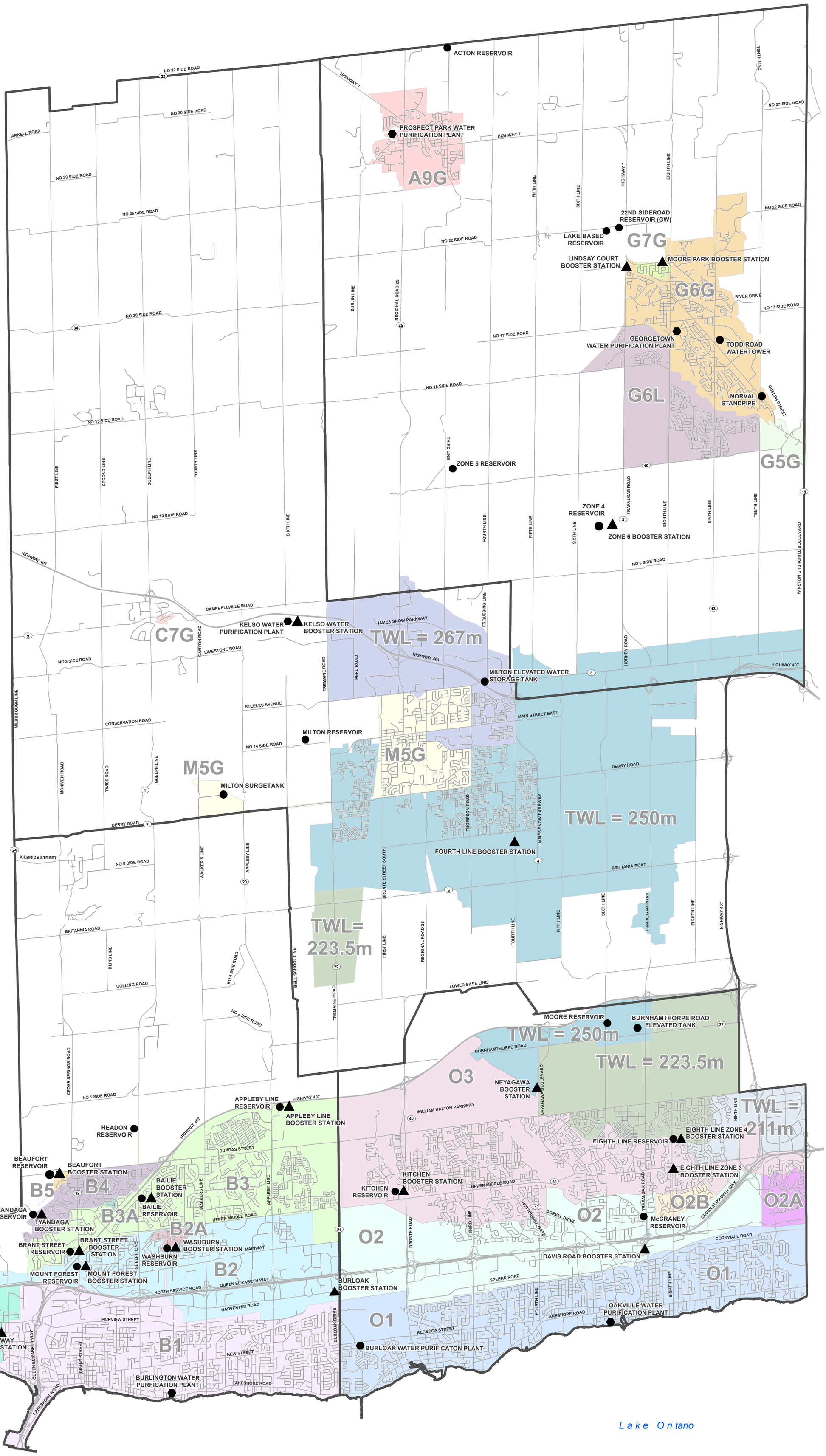
Legend

Water Pressure Zones

- A9
- B1
- B1A
- B1B
- B2
- B2A
- B3
- B3A
- B3B
- B4
- B4A
- B5
- B5A
- C7G
- G5G
- G6G
- G6L
- G7G
- M5G
- O1
- O2
- O2A
- O2B
- O3
- TWL = 211m
- TWL = 223.5m
- TWL = 250m
- TWL = 250m
- TWL = 267m

Other

- Booster Station
- Water Purification Plant
- Reservoir
- Minor Roads
- Major Roads
- MUNICIPAL BOUNDARY



GIS & Information Management
Public Works Department

HALTON REGION

Future Water Pressure Zones

Note that the pressure zone boundaries displayed in this map are approximate and subject to change.

0 0.75 1.5 3 4.5 6 Km

Public Work, May 2020

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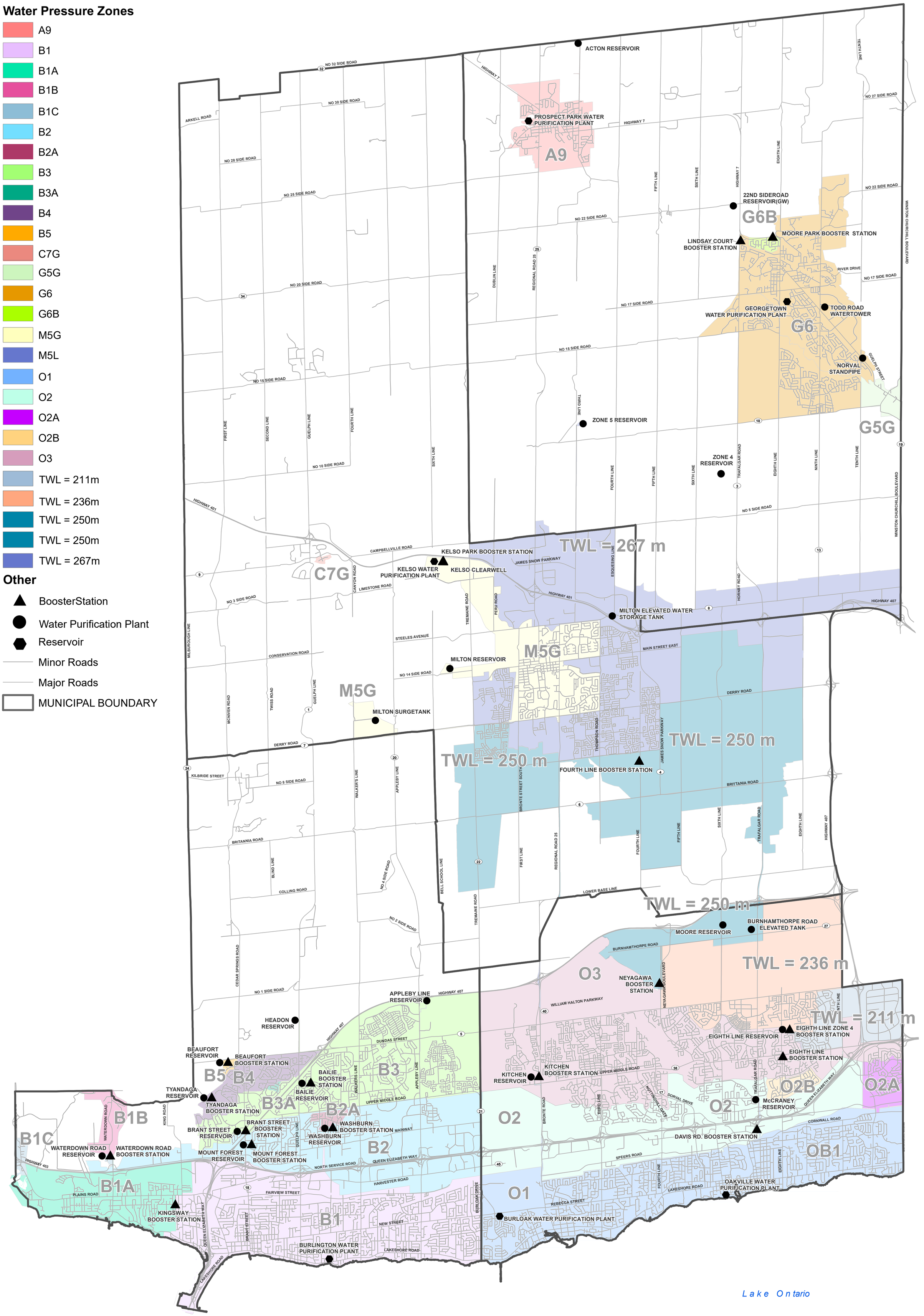
Legend

Water Pressure Zones

- A9
- B1
- B1A
- B1B
- B1C
- B2
- B2A
- B3
- B3A
- B4
- B5
- C7G
- G5G
- G6
- G6B
- M5G
- M5L
- O1
- O2
- O2A
- O2B
- O3
- TWL = 211m
- TWL = 236m
- TWL = 250m
- TWL = 250m
- TWL = 267m

Other

- BoosterStation
- Water Purification Plant
- Reservoir
- Minor Roads
- Major Roads
- MUNICIPAL BOUNDARY



GIS & Information Management
Public Works Department

HALTON REGION

Interim Water Pressure Zones

Note that the pressure zone boundaries displayed in this map are approximate and subject to change.

0 0.75 1.5 3 4.5 6 Km

Public Work, May 2020

R:\Infrastructure Management\Infrastructure Data\Projects_Requests\Internal\Claudia\MapRequest\PressureZoneMap

SUTHERLAND
CONTRACTING LTD.

(905) 220-0177
admin@sutherlandcontracting.ca
www.sutherlandcontracting.ca

November 23rd, 2023

Fire Flow Testing Report

Trafalgar Engineering - Neyagawa and Burnhamthorpe
Oakville, Ontario

Flow Hydrant #1		
Watermain Size	400mm PVC	
Location	SW Corner of Neyagawa and Burnhamthorpe	
Time	**Make/Model of Hydrant**	**Sec Valve Location**
10:21	Mueller Century	3m North
Static Pressure (psi)	**Pitot 1 Port Open (psi)**	**Pitot 2 Ports Open (psi)**
54	40	27

Residual Hydrant #1		
Watermain Size	1200mm CPP	
Location	SE Corner of Neyagawa and Burnhamthorpe	
Time	**Make/Model of Hydrant**	**Sec Valve Location**
10:21	Mueller Century	3m West
Static Pressure (psi)	**Residual Pressure 1 Port Open (psi)**	**Residual Pressure 2 Ports Open (psi)**
93	91	89

Fire Flow Calculation #1			
Pitot 1 Port Open (psi)	**Field Flow (GPM)**	**Residual Pressure (psi)**	**TFF 1 Port Open at 20 psi (GPM)**
40	**1,061**	91	**7,402**
Pitot 2 Port Open (psi)	**Field Flow (GPM)**	**Residual Pressure (psi)**	**TFF 2 Ports Open at 20 psi (GPM)**
27	**1,744**	89	**8,368**

TFF = Theoretical Fire Flow GPM = US Gallons

Flow Hydrant #2		
Watermain Size	300mm PVC	
Location	SE Corner of Burnhamthorpe and Fourth	
Time	**Make/Model of Hydrant**	**Sec Valve Location**
10:47	Mueller Century	3m North West
Static Pressure (psi)	**Pitot 1 Port Open (psi)**	**Pitot 2 Ports Open (psi)**
54	38	25

Residual Hydrant #2		
Watermain Size	300mm PVC	
Location	S Side of Burnhamthorpe, E of Fourth	
Time	**Make/Model of Hydrant**	**Sec Valve Location**
10:47	Mueller Century	3m North
Static Pressure (psi)	**Residual Pressure 1 Port (psi)**	**Residual Pressure 2 Ports (psi)**
54	52	50

Fire Flow Calculation #2			
Pitot 1 Port Open (psi)	**Field Flow (GPM)**	**Residual Pressure (psi)**	**TFF 1 Port Open at 20 psi (GPM)**
38	**1,034**	52	**4,775**
Pitot 2 Port Open (psi)	**Field Flow (GPM)**	**Residual Pressure (psi)**	**TFF 2 Ports Open at 20 psi (GPM)**
25	**1,678**	50	**5,329**

Date Report Completed:	November 23rd, 2023
Site Address:	Neyagawa and Burnhamthorpe
Contractor:	Trafalgar Engineering
Region/Municpality:	Region of Halton

This flow test report is representative of the static water pressure and flow rates only at the time the tests were completed. Results may vary during peak usage hours.

TRAFALGAR ENGINEERING LTD.

ESTIMATED WATER DEMAND

Project: ARGO Neyagawa
Desc: Draft Plan of Subdivision

Project No.: 1805
Prepared By: AJP
Checked By: NAS

	Occupancy Data					Peaking Factors			Demand Flow		
Land Use / Occupancy Type	Area (ha)	Population Density (pers/ha)	Eq. Population (cap.)	Per Cap. Demand (L/cap. Day)	Average Daily Demand (L/min)	Min. Hour	Peak Hour	Max. Daily	Min. Hour Demand (L/min)	Max. Hour Demand (L/min)	Max. Daily Demand (L/min)
Block 1 (Medium Density)	1.61	135.0	217	275	42	1.00	4.00	2.25	42	166	93
Block 2 (Mixed Use)	1.64	285.0	467	275	89	1.00	4.00	2.25	89	357	201
Block 3 (Medium Density)	1.74	135.0	235	275	45	1.00	2.25	2.25	45	101	101
Block 4 (Medium Density)	1.70	135.0	230	275	44	1.00	2.25	2.25	44	99	99
Block 5 (Medium Density)	1.15	135.0	155	275	30	1.00	2.25	2.25	30	67	67
*Per Cap. Demand based on O.B.C. Table 8.2.1.3.B. -- 5 L/1.0m^2 Stores											
TOTAL	**7.840**		**1304**		**249**				**249**	**789**	**560**

Average Daily Demand: **249 (L/min)**
Minimum Hourly Demand: **249 (L/min)**
Maximum Hourly Demand: **789 (L/min)**
Maximum Daily Demand: **560 (L/min)**
Max. Daily Plus Fire: **7560 (L/min)**

Fire Flow
Using Fire Underwriters Survey Methodology:

1. **An estimate of the fire flow is given by the formula** $F = 220C\sqrt{A}$

Where:
F = The required fire flow in litres per minute
C = Coefficient related to the type of construction
A = The total floor area in square metres (including all storeys but excluding basements at least 50% below grade)

Type of Construction: Fire-Resistive Coefficient: 0.60 Total Floor Area: 4074 (m^2)

F = 8000 (L/min)

Adequately Protected Vertical Openings: Yes

Area Note: For fire resistive buildings, consider the two largest adjoining floors plus 50% of the remaining floors up to eight, when openings are inadequately protected. For adequately protected vertical openings consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors

2. **Adjust the value in No. 1 for occupancy surcharge/reduction**

Occupancy Contents: Combustible Factor: 0%

F = 8000 (L/min)

3. **Adjust the value in No. 2 for sprinkler**

NFPA 13 Sprinkler:	Yes	Reduction:	20%
Standard Water Supply:	Yes	Reduction:	10%
Fully Supervised:	Yes	Reduction:	10%
		Total Reduction:	**40%**
		Sprinkler Reduction:	**3200 (L/min)**

4. Adjust the value in No. 2 for exposure

	Separation (m)	Charge
North	10	15%
East	50	0%
South	50	0%
West	25	10%
	Total Charge:	**25%**
	Exposure Charge:	**2000 (L/min)**

5. **Estimated Fire Flow is value in No. 2 less *Sprinkler Reduction* plus *Exposure Charge* , rounded to the nearest 1000**

F = 7000 (L/min)

TRAFALGAR ENGINEERING LTD.

ESTIMATED DEMAND PRESSURE
(AT 400mm DIAMETER WATERMAIN)

Project: ARGO Neyagawa
Desc: Draft Plan of Subdivision

Project No.: 1805
Prepared By: AJP
Checked By: NAS

Hydrant Residual Flow (Refer to Attached Flow Test Results)

Coefficient	$C=$	0.9	
Port Diameter	$D=$	2.5	(inch)
Pitot Pressure	$P_{pit}=$	40	(psig)
Residual Flow	$Q_R=$	1062	(us gpm)
Residual Flow	$Q_R=$	4020	(L/min)

Hydrant Theoretical Flow (Refer to Attached Flow Test Results)

Static Pressure	$P_{stat}=$	93	(psig)
Residual Pressure	$P_{res}=$	91	(psig)
Theoretical Pressure	$P_{theo}=$	20	(psig)
Theoretical Flow	$Q_T=$	7409	(us gpm)
Theoretical Flow	$Q_T=$	28043	(L/min)

Max. Demand Pressure

Maximum Demand	$Q_D=$	7560	(L/min)
Maximum Demand	$Q_D=$	1997	(us gpm)
Calculated Pressure	$P=$	87	(psig)

Where:

$$Q_R = 29.84 \times C \times D^2 \times P_{pit}^{0.5}$$

$$Q_T = Q_R \times [(P_{stat} - P_{theo})/(P_{stat} - P_{res})]^{0.54}$$

$$P = P_{stat} - (Q_D/Q_R)^{1.852} \times (P_{stat} - P_{res})$$

Notes:

Refer to attached hydrant flow test results for 400mm watermain on Neyagawa Boulevard prepared by Sutherland Contracting Ltd. dated November 23, 2023.

TRAFALGAR ENGINEERING LTD.

ESTIMATED DEMAND PRESSURE
(AT 300mm DIAMETER WATERMAIN)

Project: ARGO Neyagawa
Desc: Draft Plan of Subdivision

Project No.: 1805
Prepared By: AJP
Checked By: NAS

Hydrant Residual Flow (Refer to Attached Flow Test Results)

Coefficient	$C=$	0.9	
Port Diameter	$D=$	2.5	(inch)
Pitot Pressure	$P_{pit}=$	38	(psig)
Residual Flow	$Q_R=$	1035	(us gpm)
Residual Flow	$Q_R=$	3917	(L/min)

Hydrant Theoretical Flow (Refer to Attached Flow Test Results)

Static Pressure	$P_{stat}=$	54	(psig)
Residual Pressure	$P_{res}=$	52	(psig)
Theoretical Pressure	$P_{theo}=$	20	(psig)
Theoretical Flow	$Q_T=$	4780	(us gpm)
Theoretical Flow	$Q_T=$	18092	(L/min)

Max. Demand Pressure

Maximum Demand	$Q_D=$	7560	(L/min)
Maximum Demand	$Q_D=$	1997	(us gpm)
Calculated Pressure	$P=$	47	(psig)

Where:

$$Q_R = 29.84 \times C \times D^2 \times P_{pit}^{0.5}$$

$$Q_T = Q_R \times [(P_{stat} - P_{theo})/(P_{stat} - P_{res})]^{0.54}$$

$$P = P_{stat} - (Q_D/Q_R)^{1.852} \times (P_{stat} - P_{res})$$

Notes:

Refer to attached hydrant flow test results for 300mm watermain on Burnhamthorpe Road West prepared by Sutherland Contracting dated November 23, 2023.

APPENDIX 'C'

TRAFALGAR ENGINEERING

April 4, 2023 Our File: 1805

Region of Halton
Legislative & Planning Services
1075 North Service Road West
Oakville, ON L6M 2G2

Attention: Ron Mackenzie

RE: North Oakville East
Area Servicing Plan Update
Argo Neyagawa and Burnhamthorpe
Town of Oakville

TECHNICAL BRIEF

1.0 INTRODUCTION

This technical brief has been prepared as an update to the accepted Area Servicing Plan (ASP) for the North Oakville East Secondary Plan. The ASP was prepared by MMM Group on behalf of North Oakville Community Builders Inc. in 2011. This update is to permit the subject lands to drain by a gravity connection to the existing 450 mm dia. wastewater main adjacent to the subject lands on Burhamthorpe Road, immediately west of Neyagawa Boulevard. The subject lands are comprised of approximately 21.1 ha in the Neyagawa Urban Core, located at the north-west corner of Burnhamthorpe Road and Neyagawa Boulevard in the Town of Oakville.

1.1 Background

The subject lands are part of the Neyagawa Subtrunk (Subtrunk 6) drainage boundary established by the ASP. The Ultimate Wastewater Drainage Plan (Exhibit 3.8) provided in the ASP illustrates the subject lands draining to a pumping station (by others) at the south end of the drainage boundary. A review of the ASP text further explains that “an additional pumping station will likely be required for the lands west of Neyagawa Boulevard south of Burnhamthorpe Road” due to the gradient of the land being generally sloped in a southerly direction toward Sixteen Mile Creek. The ASP states that while Exhibit 3.8 illustrates a preferred alignment for subtrunks, there is flexibility in both their location and drainage boundary. The pumping station for Subtrunk 6 discharges to the 450 mm dia. gravity wastewater main on Burnhamthorpe Road, west of Neyagawa Boulevard. The Neyagawa subtrunk drains in a southerly direction to Sixteen Mile Drive, then east to George Savage Avenue, and finally south the Dundas Station (North Oakville) Pumping Station.

(905) 338-3366 #1-481 Morden Road, Oakville, ON, L6K 3W6 www.trafalgareng.com

The accepted Davis-Minardi EIR/FSS (DMN EIR/FSS) prepared for the Woodland Trails development (Davis-Minardi North Lands) illustrates the subject lands, as well as Kings Christian Collegiate (KCC), draining directly to the gravity sewer at Neyagawa and Burnhamthorpe (DMN EIR/FSS Figure 9.1). A review of record drawings available for the construction of the Burnhamthorpe wastewater main confirms a gravity connection of the KCC campus to the Burnhamthorpe sewer.

1.2 Proposal Summary

It is proposed that instead of draining the subject lands west and south to a future pumping station as illustrated in the ASP, a direct gravity connection to the existing 450 mm dia. wastewater main on Burnhamthorpe Road be made. This sewer is the ultimate receiver of the subject land's sanitary drainage and as such, is not a significant deviation from the ASP. The proposed connection is in accordance with both the accepted DMN EIR/FSS and the Halton Water and Wastewater Master Plan.

1.3 Materials Reviewed

The following materials were reviewed in the preparation of this brief:

- North Oakville East Secondary Plan (2008)
- Halton Water and Wastewater Master Plan (2011)
- Area Servicing Plan, North Oakville East Secondary Plan (2011)
- Record Drawings, Davis-Minardi Phase 1 and Mattamy Preserve Phase 2 (2014)
- East Sixteen Mile Creak Tributary EIR/FSS For Davis-Minardi North Lands (2015)
- Record Drawings, Neyagawa Boulevard (R-2388B-15, 2015)
- Halton Wastewater Operating Maps (2021)
- Regional Official Plan Amendment 49 (2022)

2.0 WASTEWATER SERVICING

In support of this ASP update, a review of existing and proposed drainage boundaries and associated flows has been undertaken to assess the impact of removing the subject lands from the future pumping station drainage boundary.

2.1 Downstream Impact Assessment

In order to assess the downstream impact (to the pumping station), a comparison of ASP estimated population and revised condition population was undertaken.

2.1.1 ASP Boundary

There is some discrepancy within the ASP regarding the population of the Subtrunk 6 drainage boundary. The body of the ASP references a "developable" area of 240 ha with an equivalent population of approximately 17,825 persons (roughly 74 ppha); the accompanying preliminary design sheet included in the ASP appendices however appears to have an accumulated area of 240 ha and an equivalent population of 14,692 persons (roughly 61 ppha). Based solely on the overall population density, the body of the report provides more conservative measure.

Trafalgar attempted to reproduce the area and population calculations for Subtrunk 6 at discharge node 6-C with some mixed success. While the design sheet indicates an area of 94.73 ha, our own takeoff based on a scaled copy of Exhibit 3.8 indicates an area of 98.53 ha (approximately 4% difference, which we consider nominal). A greater discrepancy is noted in terms of the equivalent population: using the population densities found on the ASP design sheet, Trafalgar estimates a population of approximately 7,153 persons (73 ppha) at node 6-C versus the ASP design sheet's 4,803 persons (51 ppha). A breakdown of the areas and population is provided in Table 1. Although Trafalgar's numbers deviate somewhat from the design sheet, the difference in population brings the total population closer to that of the body of the ASP.

2.1.2 Revised Boundary

In addition to the subject lands, it should be noted that the lands occupied by KCC and the Davis-Mindari North subdivision are also removed from the pumping station tributary, as per the approved EIR/FSS. It is worth noting that the equivalent population for the subject lands as taken from the Davis-Mindardi EIR/FSS is higher than the ASP; the EIR/FSS uses a population density of 90 ppha for employment lands compared to 43 ppha indicated on the ASP design sheet. Both the ASP and revised boundaries are shown on Figure 1, but the equivalent population for the removed lands is based on the Davis-Minardi EIR/FSS for consistency with that document.

Table 2 provides the revised Subtrunk 6 boundary land use areas and equivalent population calculated using the ASP population densities for direct comparison. By removing the subject lands ("Employment Area") from the pumping station tributary, the station can be sized for approximately 1,381 fewer persons; this represents an 8% reduction in population as taken from the ASP body. Since the overall population is reduced, and detailed design of the future pumping station has not been undertaken at the time of this report, the impact to the future pumping station is negligible. Detailed design of the future pumping station is by others.

Table 1 – Subtrunk 6 ASP Boundary: Land Use Areas and Population

NOE Secondary Plan Land Use	ASP Land Use	Area (ha)	Population Density (ppha)	Population (persons)
Sub Urban Area	Residential, Gen Urban & Suburban	39.81	67	2667
General Urban Area	Residential, Gen Urban & Suburban	29.97	67	2008
Neighbourhood Centre Area	Residential, Urban Core	4.88	200	976
Neyagawa Urban Core	Urban Core Areas	6.63	100	663
Employment Area	Employment	14.67	43	631
Elementary School	Schools, Elementary	2.57	81	208
Net Developable Area		**98.53**	**73**	**7153**
Road Network		35.30		-
Parks and Open Space:				
Village Square/Urban Square		0.93		-
Community Park		15.31		-
Neighbourhood Park		3.93		-
Stormwater Management Facility		6.60		-
Transit Way and MTO Land		15.70		-
Natural Heritage System		102.75		-
Net Undevelopable Area		**180.52**		**-**
Total Calculated Area		**279.05**		**7153**
Boundary Area		278.90		
Error (%)		0.05%		

Table 2 – Subtrunk 6 Revised Boundary: Land Use Areas and Population

NOE Secondary Plan Land Use	ASP Land Use	Area (ha)	Population Density (ppha)	Population (persons)
Sub Urban Area	Residential, Gen Urban & Suburban	39.81	67	2667
General Urban Area	Residential, Gen Urban & Suburban	28.67	67	1921
Neighbourhood Centre Area	Residential, Urban Core	4.88	200	976
Elementary School	Schools, Elementary	2.57	81	208
Net Developable Area		**75.93**	**76**	**5772**
Road Network		32.79		-
Parks and Open Space:				
Village Square/Urban Square		0.93		-
Community Park		15.31		-
Neighbourhood Park		3.93		-
Stormwater Management Facility		6.60		-
Transit Way and MTO Land		10.96		-
Natural Heritage System		102.75		-
Net Undevelopable Area		**173.27**		**-**
Total Calculated Area		**249.20**		**5772**
Boundary Area		249.30		
Error (%)		-0.04%		

2.2 Land Use Change and Future Flows

It is acknowledged that as part of ROPA 49 and Town of Oakville led OPA 326, the anticipated population densities of the Neyagawa Urban Core (including the subject lands) have increased over those anticipated by both the Region's master plan and the ASP. Any impact resulting from the change in population density will be discussed in detail in the EIR/FSS being prepared by this office for the subject lands and is therefore not under discussion in this brief.

3.0 CONCLUSION

The proposed revision to the ASP Subtrunk 6—having the subject lands drain directly by gravity to the existing 450 mm dia. wastewater main on Burhamthorpe Road immediately west of Neyagawa Boulevard—has negligible impact on the future pumping station (by others). The proposed change is in accordance with the Region's Water and Wastewater Master Plan and the Davis-Minardi EIR/FSS, which includes the subject lands.

If you require any additional information, please contact this office.

Yours very truly,

Digitally signed by James Tarleton Nelson -- P.Eng. - PEO
Date: 2023.04.04 12:04:38 -04'00'

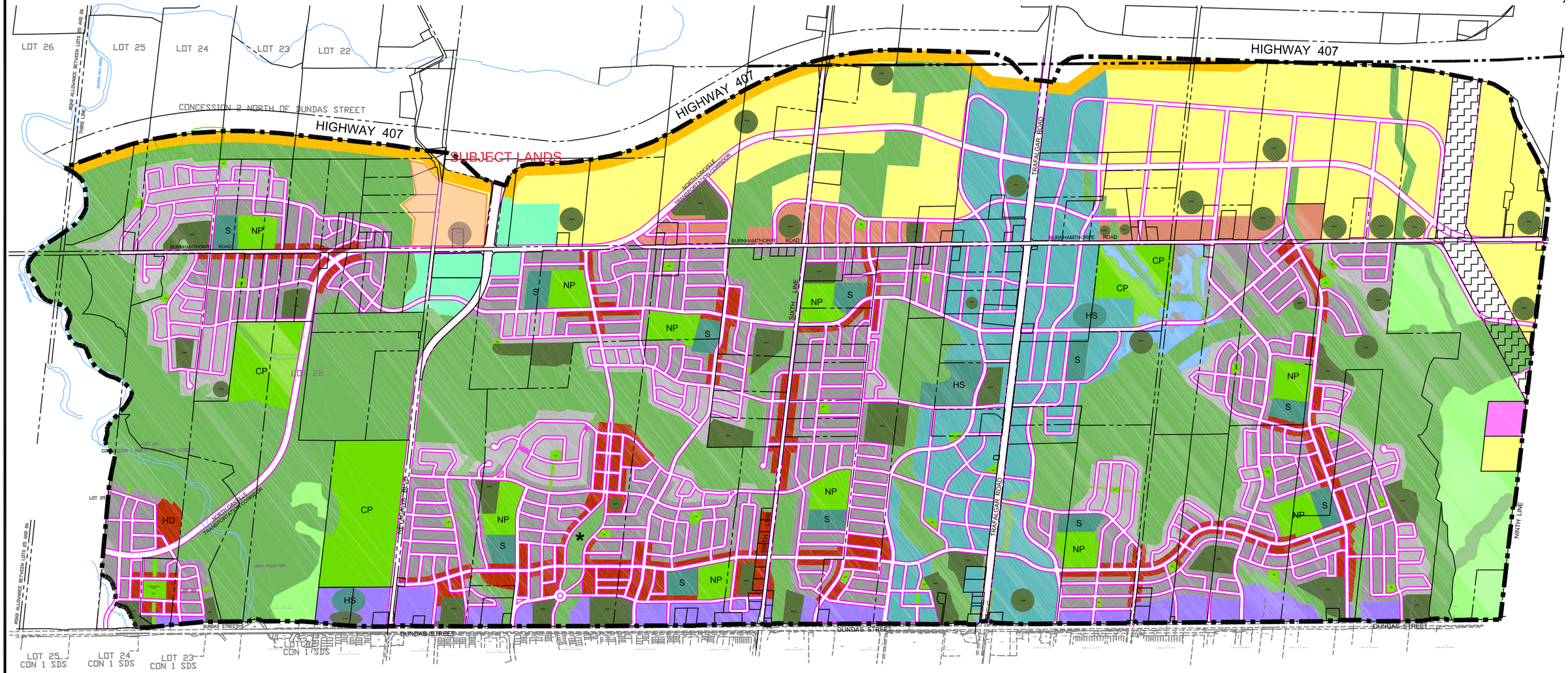
LICENSED PROFESSIONAL ENGINEER
J.T. NELSON
100199369
PROVINCE OF ONTARIO

J.T. Nelson, P.Eng.,
Principal

JN:

ATTACHMENT #1

ASP Exhibit 1.1 (Secondary Plan – Land Use)
ASP Exhibit 3.8 (Ultimate Wastewater Drainage Plan)
ASP unnumbered Exhibit (Ultimate Wastewater Drainage Plan)
ASP Design Sheet



SOURCE: BASEPLAN FROM NORTH OAKVILLE MASTER PLAN APPENDIX 7.3 BY THE TOWN OF OAKVILLE ON AUGUST 13, 2007

500 300 100 0 750 metres
400 200

LEGEND

- SECONDARY PLAN AREA BOUNDARY
- OAKVILLE / MILTON MUNICIPAL BOUNDARY
- TRANSITWAY
- DUNDAS STREET URBAN CORE AREA
- NEYAGAWA BLVD. URBAN CORE AREA
- TRAFALGAR ROAD URBAN CORE AREA
- TRANISITIONAL AREA
- EMPLOYMENT AREA
- NATURAL HERITAGE SYSTEM AREA
- INSTITUTIONAL AREA
- STORMWATER MANAGEMENT FACILITY (final location tbd)
- CP COMMUNITY PARK AREA
- NP NEIGHBOURHOOD PARK AREA
- VILLAGE SQUARE/URBAN SQUARE
- S ELEMENTARY SCHOOL SITE
- HS SECONDARY SCHOOL SITE
- JOSHUA CREEK FLOODPLAIN AREA
- UTILITY CORRIDOR
- NEIGHBOURHOOD ACTIVITY NODE
- CEMETERY AREA
- NEIGHBOURHOOD CENTRE AREA
- GENERAL URBAN AREA
- SUB URBAN AREA
- HD HIGH DENSITY RESIDENTIAL AREA
- * POLICY REFERENCE - SEE POLICY SECTION 7.4.7.2

PROJECT

NORTH OAKVILLE COMMUNITY BUILDERS INC.

TITLE

SECONDARY PLAN - LAND USE

MMM GROUP

Checked	A.W.	Drawn	
Date	MARCH 2008	Proj. No.	10-02076
Scale	NTS	Exhibit No.	1.1

PRINTED ON: FILE NAME: H:\10-02076\design\Mar 2008 Report Figures\Masterplan AUG 13 07 Base for Prelim Phasing.dwg_1 to 5000

HIGHWAY 407

HIGHWAY 407

SUBJECT LANDS

NORTH OAKVILLE TRANSPORATION CORRIDOR

SIXTH LINE

TRAFALGAR ROAD

BURNHAMTHORPE ROAD

FORCEMAIN

BURNHAMTHORPE ROAD

HIGHWAY 403

PS

FORCEMAIN (OPTION)

NORTH OAKVILLE TRANSPORATION CORRIDOR

NEYAGAWA BLVD.

FORCEMAIN

LOCAL PS

PS

PS

DUNDAS STREET

FORCEMAIN

NINTH LINE

1200Ø

2x750Ø WWFM

1050Ø

975Ø

825Ø

600Ø

2x400Ø WWFM

PROUDFOOT TRAIL

NEYAGAWA BLVD.

TOWNE BLVD.

HARMAN GATE

SIXTH LINE

OAK PARK BLVD.

TRAFALGAR ROAD

EIGHTH LINE

PRINCE MICHAEL DRIVE

MEADOW RIDGE DRIVE

500 400 300 200 100 0 750 metres

LEGEND

- DUNDAS STREET TRUNK SEWER
- DUNDAS STREET FORCEMAIN
- SUB-TRUNK SEWER
- SUB-TRUNK FORCEMAIN
- PS WASTEWATER PUMPING STATION (APPROXIMATE LOCATION)
- SUB-TRUNK DRAINAGE BOUNDARY

NOTE: SUB-TRUNK SEWER AND DRAINAGE BOUNDARY LOCATIONS ARE IN GENERAL CONFORMANCE TO HALTON REGION'S PROPOSED LOCATION AND SHALL BE FURTHER REFINED IN THE DEVELOPMENT SPECIFIC FUNCTIONAL SERVICING REPORTS.

PROJECT

NORTH OAKVILLE COMMUNITY BUILDERS INC.

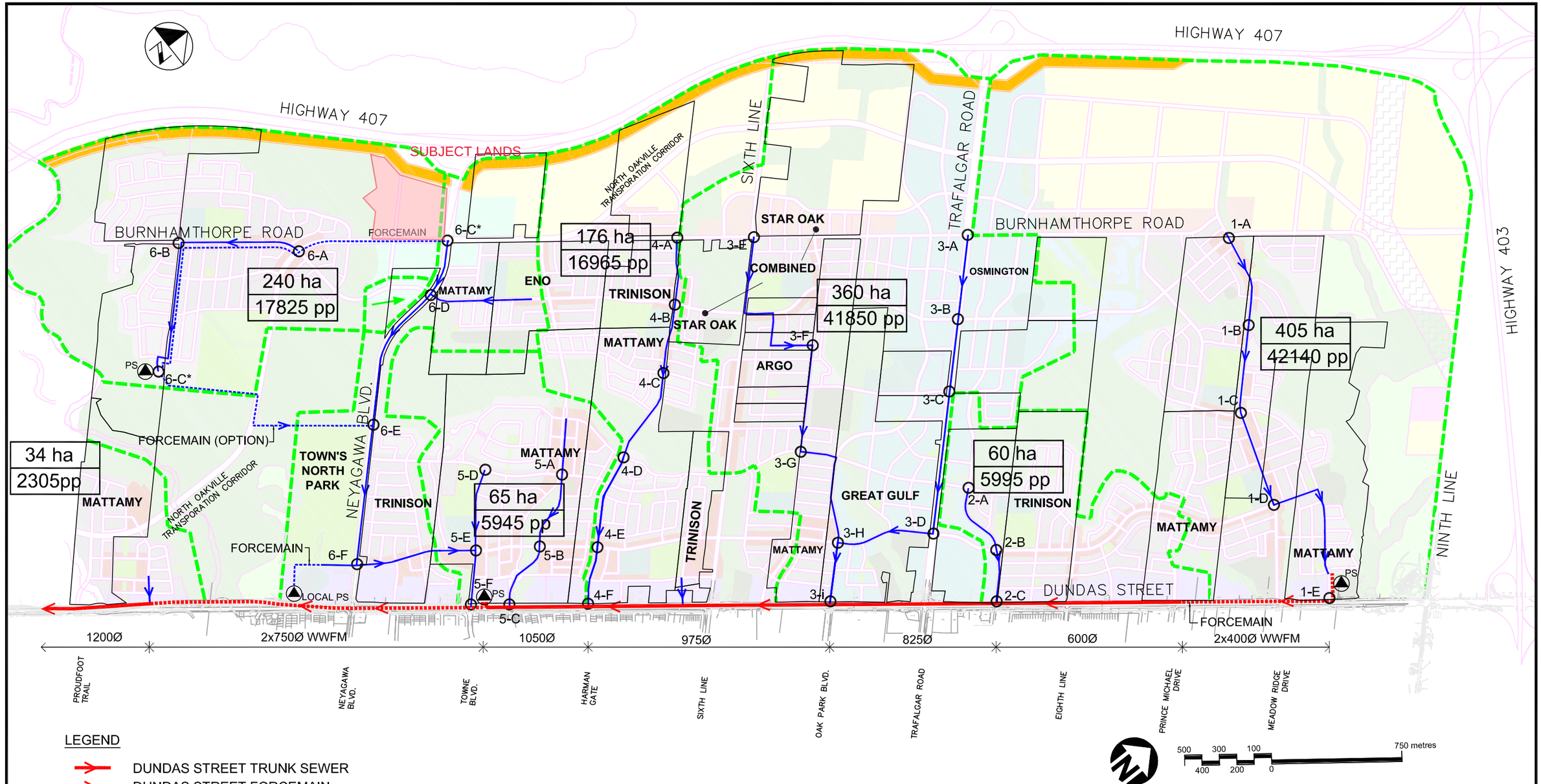
TITLE

ULTIMATE WASTEWATER DRAINAGE PLAN

MMM GROUP

Checked	M.A.E.	Drawn	T.Y.
Date	AUGUST 2010	Proj. No.	10-02076
Scale	NTS	Exhibit No.	3.8

PRINTED ON: FILE NAME: H:\10-02076\MUN\general\PH1-Ultimate.dwg_ULTIMATE



LEGEND

- DUNDAS STREET TRUNK SEWER
- DUNDAS STREET FORCEMAIN
- SUB-TRUNK SEWER
- SUB-TRUNK FORCEMAIN
- PS — WASTEWATER PUMPING STATION (APPROXIMATE LOCATION)
- SUB-TRUNK DRAINAGE BOUNDARY
- 75 ha / 4000pp — DEVELOPABLE AREA POPULATION

PROJECT

NORTH OAKVILLE COMMUNITY BUILDERS INC.

TITLE

ULTIMATE WASTEWATER DRAINAGE PLAN

MMM GROUP

Checked	M.A.E.	Drawn	T.Y.
Date	AUGUST 2010	Proj. No.	10-02076
Scale	NTS	Exhibit No.	

PRINTED ON: FILE NAME: H:\10-02076\MUN\general\PH1-Ultimate.dwg_DRAINAGE 11X17

THE REGIONAL MUNICIPALITY OF HALTON

PROJECT No.: 10-02076
PROJECT NAME: North Oakville - Dundas Sanitary Trunk Sewer
CONSULTANT: MMM GROUP LTD.

WASTEWATER DESIGN SHEET
Regional Mains

PRELIMINARY

DATE PRINTED: 29-Mar-11
DATE REVISED: 17-Feb-11
DESIGNED BY: TY
CHECKED BY: MAE

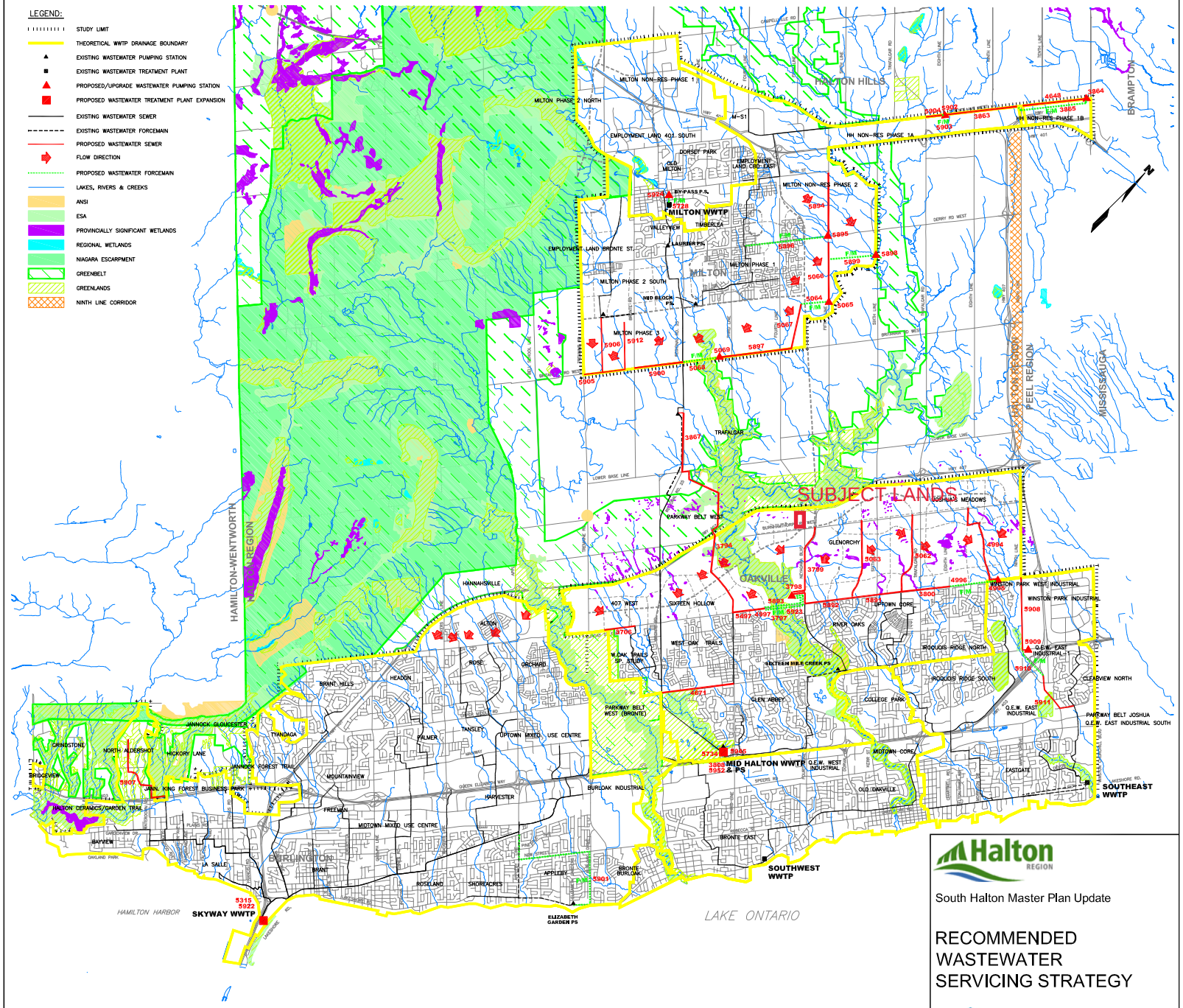
TRUNK	STRETCH From	STRETCH To	Length in metres	Tributary Area (Hectares) Increment Res.	Comm.	Ind.	Inst.	Total	Accumulated Res.	Comm.	Ind.	Inst.	Total	Tributary Population Increment Res.	Comm.	Ind.	Inst.	Total	Accumulated Res.	Comm.	Ind.	Inst.	Total	Q Average L/s	K Average	Peaking Factor M	Q Peak Dry L/s	Total Infil-tration L/s	Q Total L/s	SEWER Size (mm)	Slope (m/m)	Q (L/s)	V (m/s) Full Flow	V (m/s) Act. Flow	REMARKS
	5E			-										-																					Flows from
				0.86										-																					Neyagawa
				1.44										-																					trunk added
				-										-																					
				0.44			-							30			0																		
		5F		3.52	-	-	-	6.27	**212.71**	**21.00**	**29.02**	**16.21**	**278.94**	705	0	0	0	735	**12867**	**2100**	**1248**	**1313**	**17528**	55.249	0.96	2.607	144.03	79.78	223.81	600	0.20	274.6	1.263	1.43	
SUBTRUNK	6A			3.28										-																					
6				4.51										-																					
				-										-																					
				2.17										-																					
				18.04			2.57							1207			208																		
		6B		4.76	-	-	-	35.33	32.76	0.00	0.00	2.57	35.33	952	0	0	0	2367	2159	0	0	208	2367	7.197	1.00	3.528	25.39	10.10	35.49	300	0.50	68.4	1.258	1.28	
	6B			2.84										-																					
				6.68										-																					
				3.87										-																					
				9.61										-																					
				36.39			-							2436			0																		
		6C		0.00	-	-	-	59.40	92.16	0.00	0.00	2.57	94.73	0	0	0	0	2436	4595	0	0	208	4803	14.952	1.00	3.261	48.76	27.09	75.85	375	0.50	124.0	1.459	1.55	
	6C			3.82										-																					
				1.80										-																					
				2.19										-																					
				2.39										-																					
				11.39			2.86							763			232																		
		6D		12.39	15.14	29.02	-	81.01	126.15	15.14	29.02	5.43	175.74	2477	1514	1248	0	6234	7835	1514	1248	440	11037	36.105	0.95	2.761	99.68	50.26	149.95	450	0.50	201.6	1.648	1.81	
	6D			-										-																					
				7.03										-																					
				-										-																					
				-										-																					
				-			-							0			0																		
		6E		-	-	-	-	7.03	133.17	15.14	29.02	5.43	182.77	0	0	0	0	0	7835	1514	1248	440	11037	36.105	0.95	2.767	99.90	52.27	152.17	450	0.50	201.6	1.648	1.81	
	6E			-										-																					
				2.29										-																					
				-										-																					
				18.40										-																					
				13.70			-							917			0																		
		6F		-	-	-	-	34.40	167.57	15.14	29.02	5.43	217.17	0	0	0	0	917	8753	1514	1248	440	11955	39.025	0.96	2.757	107.60	62.11	169.71	525	0.50	304.1	1.826	1.88	
	6F			-										-																					
				0.30										-																					
				-										-																					
				-										-																					
				1.28			-							86			0																		
		5E		6.94	5.86	-	8.37	22.75	**176.09**	**21.00**	**29.02**	**13.80**	**239.92**	1388	586	0	678	2738	**10227**	**2100**	**1248**	**1118**	**14692**	46.539	0.96	2.664	123.98	68.62	192.59	600	0.20	274.6	1.263	1.36	
TRUNK	PS-M	WEST							**732.33**	**158.80**	**364.60**	**47.90**	**1303.63**						**60137**	**15880**	**15678**	**3880**	**95575**	319.657	0.92	1.848	590.78	372.84	963.62	1050	0.20	1221.2	1.833	2.05	
TOTAL				732.33	158.80	364.60	47.90	1303.63	908.42	179.80	393.62	61.70	1543.55	60137	15880	15678	3880	95575	70364	17980	16926	4998	110267												

Residential	275.00	L/cap/d
Comm	26.00	m3/ha/d
Ind	17.63	m3/ha/d
Inst	10.94	m3/ha/d
Residential		
Urban Core	200	pp/ha
Gen Urban & Suburban	67	pp/ha
Schools		
Elementary (low den I)	81	pp/ha
Secondary (Low Den II)	81	pp/ha
Employment		
- light employment/ind	43	pp/ha
Transitional area	135	pp/ha
- similar to Townhouses		
Urban Core Areas	100	pp/ha
- mixed used:		
- medium to high~townhouse		

Res.	Comm.	Ind.	Inst.
Transitway			
Green			
SWM			
Park			
Gen Urb			Elem
Urban Core	Comm	Emp	HS

ATTACHMENT #2

Excerpt from Halton Water and Wastewater Master Plan, Figure 30



Halton REGION

South Halton Master Plan Update

RECOMMENDED WASTEWATER SERVICING STRATEGY

Figure 30

KMK Consultants Limited

OCT 2008
1:40,000
2853-8-74

Halton REGION

Sustainable Halton
Water and Wastewater Master Plan

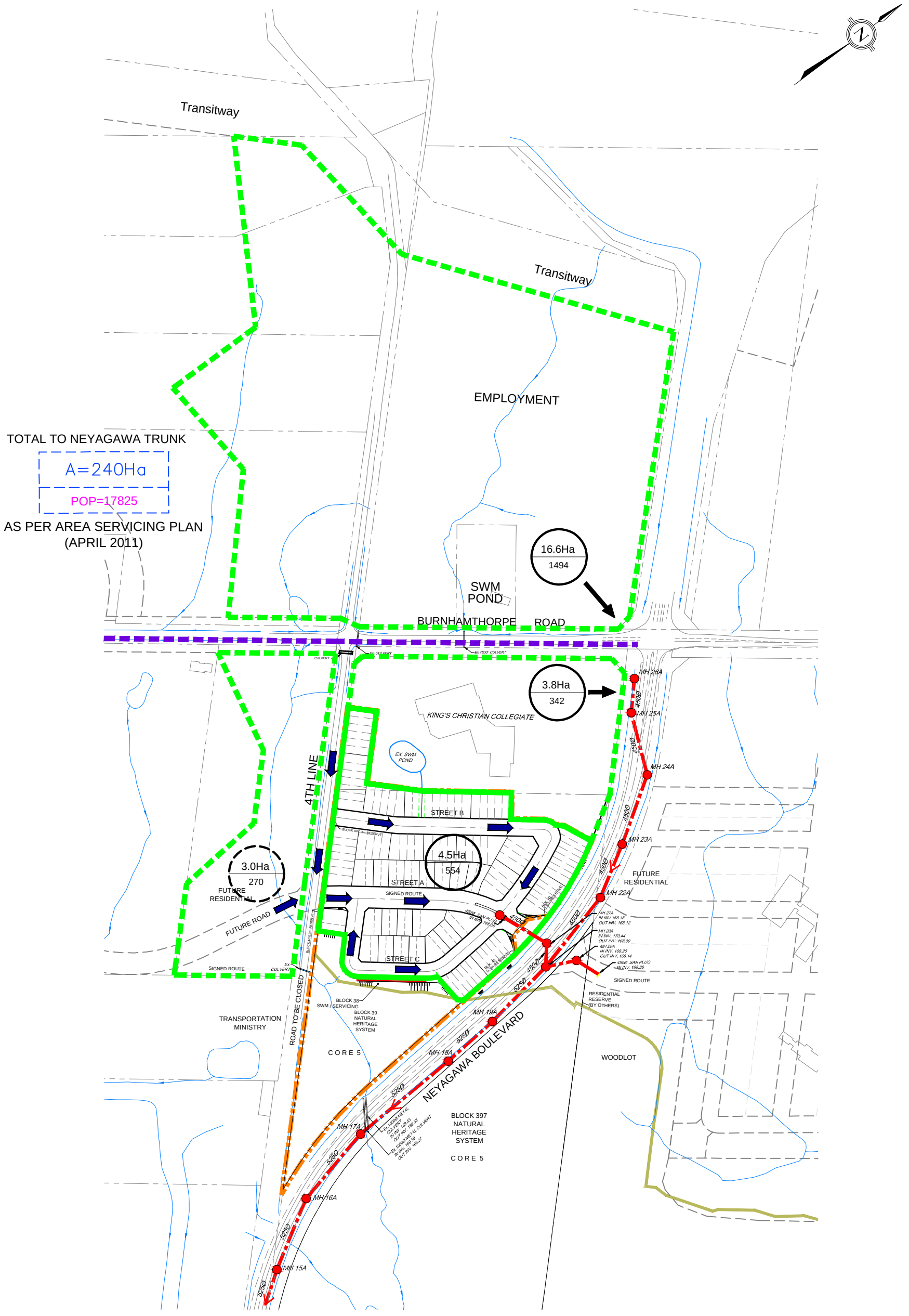
2008 Water and Wastewater Master Plan Update
Wastewater Servicing Strategy
Figure 11

AECOM

October 2011
1:40,000
60114062-S31 S

ATTACHMENT #3

Davis Minardi EIR/FSS Figure 9.1 (Conceptual Wastewater Servicing)



Legend

- Subject Lands
- Core 5 Boundary
- Existing Wastewater Sewer
- Wastewater Drainge Area
- External Wastewater Drainge Area
- Future Forcemain (By Others)
- Wastewater Flow Direction
- Existing Wastewater Manhole

4.6Ha / 554 — Drainage Area / Population

Stonybrook Consulting Inc.
David Schaeffer Engineering Ltd.
Bird and Hale
R.J. Burnside & Associates
Stantec Consulting Ltd.
JTB Environmental Systems
J.F. Sabourin and Associates Inc.

EAST SIXTEEN MILE CREEK TRIBUTARY ENVIRONMENTAL IMPLEMENTATION REPORT AND FUNCTIONAL SERVICING STUDY FOR DAVIS-MINARDI NORTH

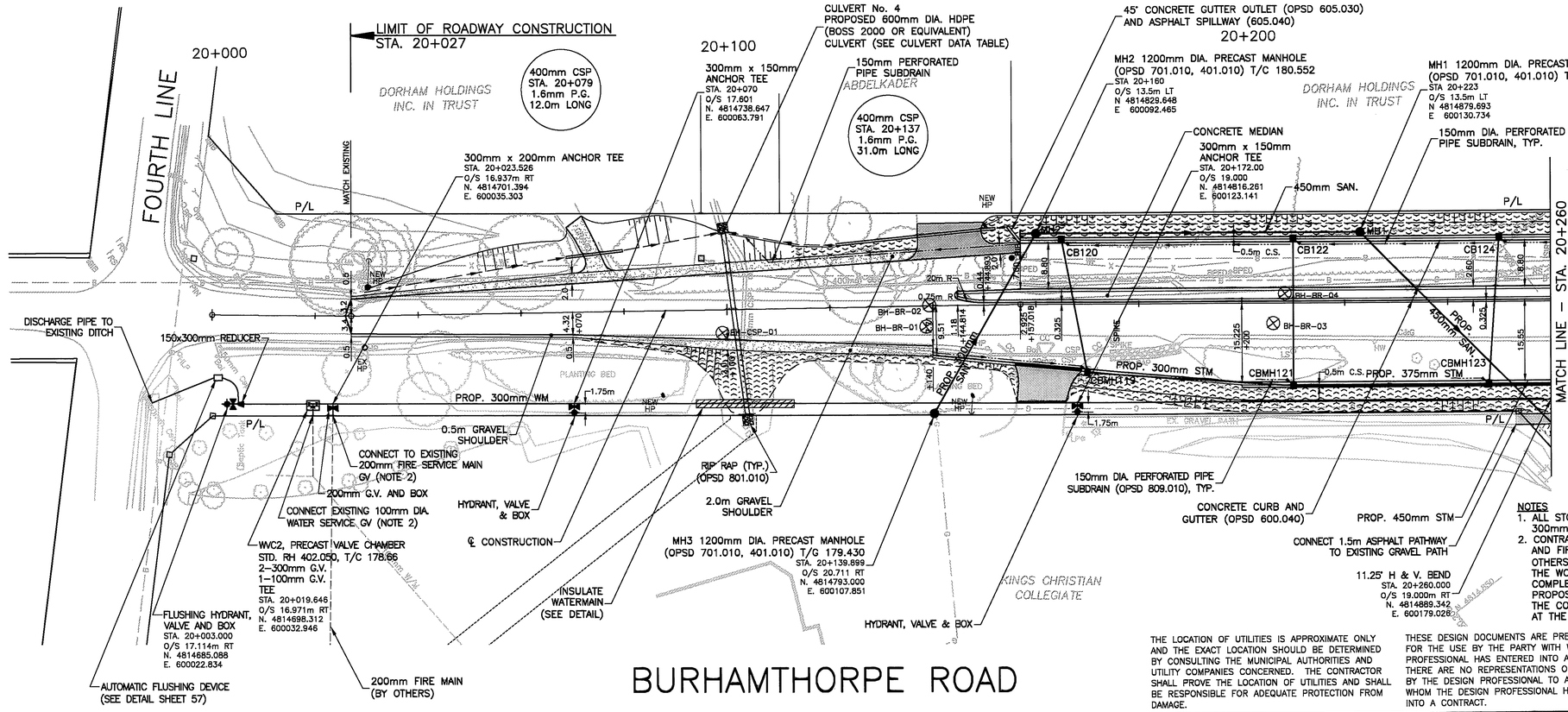
FIGURE 9.1

CONCEPTUAL WASTEWATER SERVICING

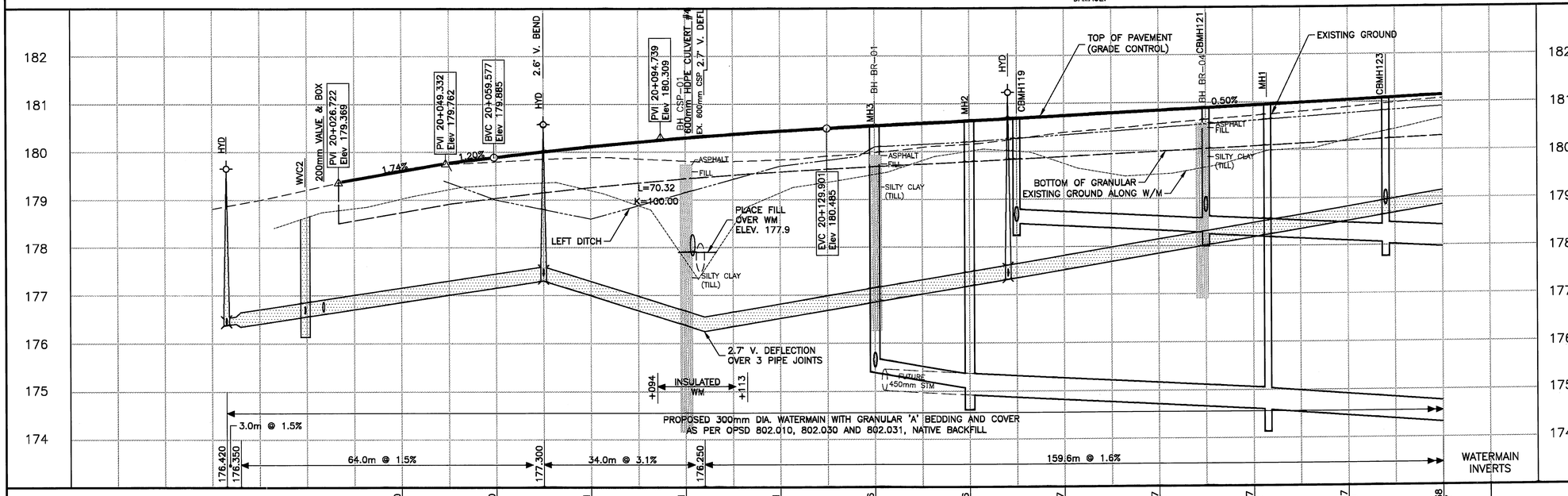
JUNE 2015

ATTACHMENT #4

Record Drawings
Missing: drainage area plan
Missing: sanitary sewer design sheet



BURHAMTHORPE ROAD



℄ ELEVATIONS	179.600 179.59	179.890 179.80	180.111 179.89	180.291 179.81	180.431 179.83	180.536 179.98	180.636 180.15	180.737 180.40	180.837 180.56	180.937 180.72	181.037 180.89	181.138 181.07		
SANITARY SEWER INVERTS						S.175.58 N.175.27	300mm PVC SAN. 39.7m @ 0.5%	S.175.07 E.174.92	450mm PVC, SAN. 63.1m @ 0.5%		SW.174.60 SE.174.58	450mm PVC, SAN. 69.1m @ 0.5%		
STORM SEWER INVERTS										N.178.520 E.178.490	300mm DIA. CL. 3, CONC. STM. 40.1m @ 0.5%	N.178.700 E.178.250 W.178.280	375mm DIA. CL. 3, CONC. STM. 38.0m @ 0.5%	N.178.900 E.178.020 W.178.050
STATIONS	20+000 20+003 20+006	20+020	20+040	20+049.00 20+051.00	20+060	20+070	20+080	20+091.50	20+100 20+104	20+112.80	20+120	20+140	20+160	20+180

STATIONS	20+200	20+220	20+240	450mm CL. 3, CONC. STM. 34.3m @ 0.5%	20+260									

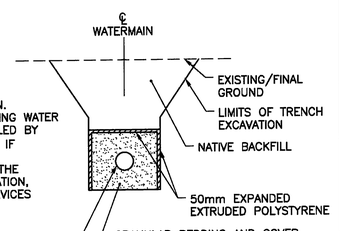
STORM SEWER DATA

MH	STATION	CENTRELINE CONSTRUCTION OFFSET *	MH STD. DWG	INVERTS		FRAME & COVER STD.	T/F ELEVATION
				INLET	OUTLET		
CBMH119	20+170	13.214RT	701.010	N.178.520	E.178.490	400.082	180.566
CB120	20+165	12.433LT	705.010		S.178.946	400.082	180.566
CBMH121	20+210	15.933RT	701.010	N.178.700 W.178.280	E.178.250	400.082	180.712
CB122	20+210	12.433LT	705.010		S.179.162	400.082	180.782
CBMH123	20+248	15.933RT	701.010	N.178.900 W.178.050	E.178.020	400.082	180.912
CB124	20+250	12.433LT	705.010		S.179.47	400.082	180.982

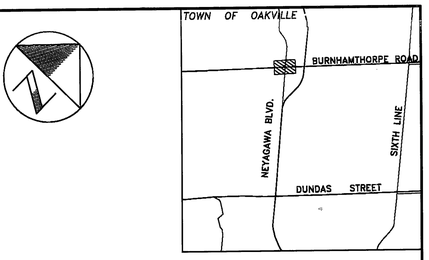
* OFFSET TO CENTRE OF FRAME AND GRATE / COVER

CULVERT DATA

CULVERT NO.	DIA. (mm)	LENGTH (m)	INVERTS			OUTLET			REMARKS
			STATION	C/L CONST. OFFSET	INV. ELEV.	STATION	C/L CONST. OFFSET	INV. ELEV.	
4	600	35.100	20+099.6	14.60OLT	178.200	20+103.6	20.300RT	177.190	HDPE



TRENCH INSULATION DETAIL
SCALE 1:50



NOTES
1. ALL STORM SEWER LATERAL PIPES ARE 300mm DIA. UNLESS OTHERWISE SHOWN.
2. CONTRACTOR SHALL CONNECT TO EXISTING WATER AND FIRE SERVICE GATE VALVES INSTALLED BY OTHERS (KINGS CHRISTIAN COLLEGIATE). IF THE WORK BY OTHERS HAS NOT BEEN COMPLETED PRIOR TO COMPLETION OF THE PROPOSED 300mm WATERMAIN INSTALLATION, THE CONTRACTOR SHALL PLUG THE SERVICES AT THE PROPERTY LINE.

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE.

THESE DESIGN DOCUMENTS ARE PREPARED SOLELY FOR THE USE BY THE PARTY WITH WHOM THE DESIGN PROFESSIONAL HAS ENTERED INTO A CONTRACT AND THERE ARE NO REPRESENTATIONS OF ANY KIND MADE BY THE DESIGN PROFESSIONAL TO ANY PARTY WITH WHOM THE DESIGN PROFESSIONAL HAS NOT ENTERED INTO A CONTRACT.

NO	Date	By	REVISIONS	MANU CAD
	04/14/15		ISSUED FOR CONSTRUCTION	
	02/24/15		ISSUED FOR TENDER	

Design	D.S.W.	Ch'kd	R.I.R.	Date MARCH, 2013
Drawn	S.J.	Ch'kd	R.I.R.	

Scale 1:500 Horiz. (-10, -5, 0, 10) 1:50 Vert. (-1.0, -0.5, 0, 1.0)

References

Regional

Field Notes

ACCEPTED FOR CONSTRUCTION OF REGIONAL INFRASTRUCTURE
Reviewed For Compliance With Regional Standards Only.
Director
Manager May 15, 2015

Stamp: REGISTERED PROFESSIONAL ENGINEER R.I.ROOK 04/14/15 PROVINCE OF ONTARIO

MMM GROUP

Halton REGION

TITLE
PROPOSED CONSTRUCTION
BURNHAMTHORPE ROAD (REG. RD. 27)
IN THE TOWN OF OAKVILLE
FROM 40m EAST OF FOURTH LINE TO 40m WEST OF NEYAGAWA BOULEVARD

Consultant File NO

Regional Drawing NO

CONTRACT NO R-2388B-15

Drawing NO SHEET 21 OF 58

R-2388B-15 21 of 58

DRAWING: I:\DRAWINGS\MUNICIPAL\3212001\DWGFILES\3212001-400-12 TO 23-PLAN AND PROFILES.DWG
LAYOUT TAB: SHT 21
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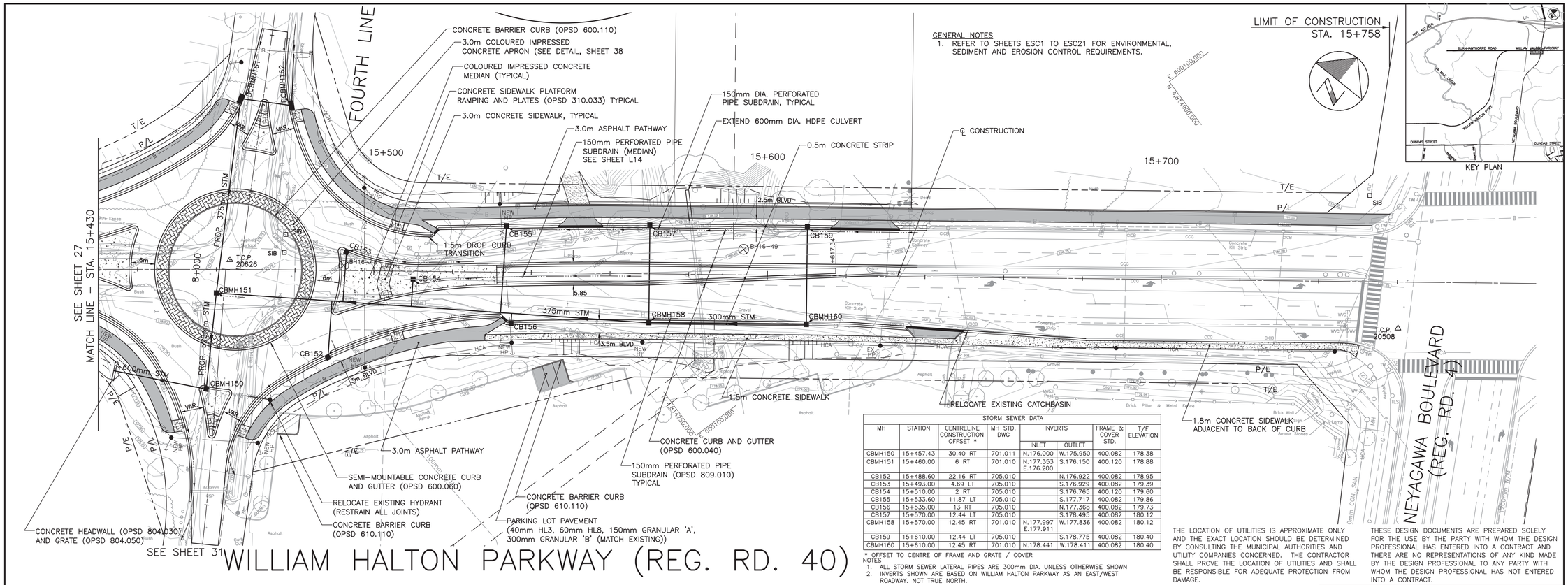


GENERAL NOTES

1. REFER TO SHEETS ESC1 TO ESC21 FOR ENVIRONMENTAL, SEDIMENT AND EROSION CONTROL REQUIREMENTS.

STORM SEWER DATA

MH	STATION	CENTRELINE CONSTRUCTION OFFSET *	MH STD. DWG	INVERTS		FRAME & COVER STD.	T/F ELEVATION
				INLET	OUTLET		
CBMH150	15+457.43	30.40 RT	701.011	N.176.000	W.175.950	400.082	178.38
CBMH151	15+460.00	6 RT	701.010	N.177.353 E.176.200	S.176.150	400.120	178.88
CB152	15+488.60	22.16 RT	705.010		N.176.922	400.082	178.95
CB153	15+493.00	4.69 LT	705.010		S.176.929	400.082	179.39
CB154	15+510.00	2 RT	705.010		S.176.765	400.120	179.60
CB155	15+533.60	11.87 LT	705.010		S.177.717	400.082	179.86
CB156	15+535.00	13 RT	705.010		N.177.368	400.082	179.73
CB157	15+570.00	12.44 LT	705.010		S.178.495	400.082	180.12
CBMH158	15+570.00	12.45 RT	701.010	N.177.997 E.177.911	W.177.836	400.082	180.12
CB159	15+610.00	12.44 LT	705.010		S.178.775	400.082	180.40
CBMH160	15+610.00	12.45 RT	701.010	N.178.441	W.178.411	400.082	180.40

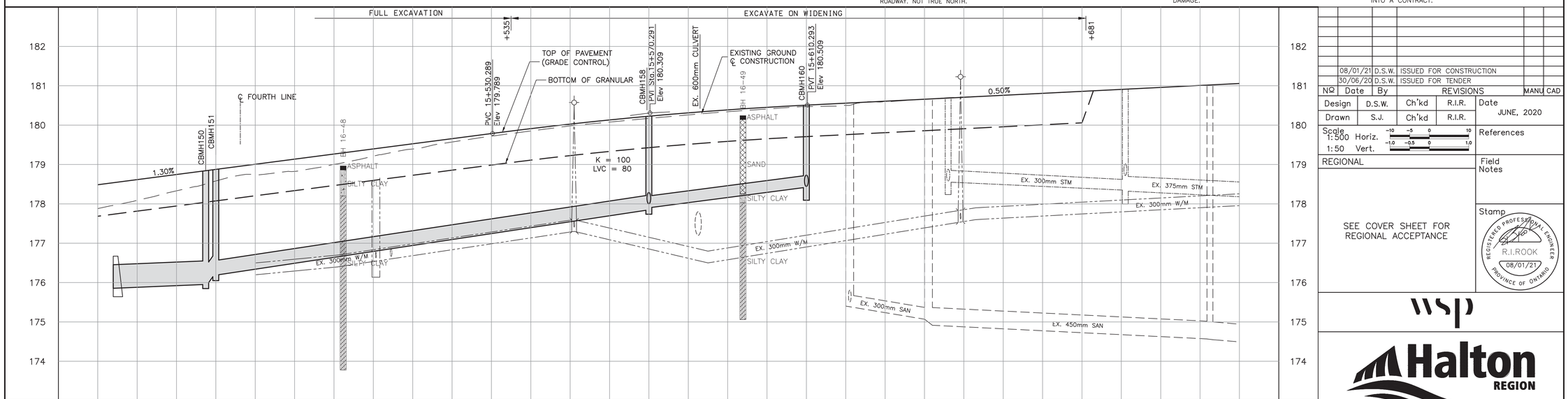
* OFFSET TO CENTRE OF FRAME AND GRATE / COVER

NOTES

1. ALL STORM SEWER LATERAL PIPES ARE 300mm DIA. UNLESS OTHERWISE SHOWN
2. INVERTS SHOWN ARE BASED ON WILLIAM HALTON PARKWAY AS AN EAST/WEST ROADWAY. NOT TRUE NORTH.

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE.

THESE DESIGN DOCUMENTS ARE PREPARED SOLELY FOR THE USE BY THE PARTY WITH WHOM THE DESIGN PROFESSIONAL HAS ENTERED INTO A CONTRACT AND THERE ARE NO REPRESENTATIONS OF ANY KIND MADE BY THE DESIGN PROFESSIONAL TO ANY PARTY WITH WHOM THE DESIGN PROFESSIONAL HAS NOT ENTERED INTO A CONTRACT.



ELEVATIONS	178.615 178.09	178.875 178.58	179.135 178.82	179.395 179.21	179.655 179.57	179.911 179.85	180.131 180.08	180.312 180.26	180.452 180.41	180.558 180.50	180.658 180.66	180.758 180.76	180.858 180.85	
STORM SEWER INVERTS	175.850	W.175.950 N.176.000	S.176.150 N.177.353 E.176.200	600mm DIA. CL. 65–D CONC. STM. 23.97m @ 0.42% 525mm DIA. CL. 65–D CONC. STM. 24.54m @ 0.61% 375mm DIA. CL. 3 CONC. STM. 110m @ 1.49%					W.177.836 N.177.997 E.177.911	300mm DIA. CL. 3 CONC. STM. 40.00m @ 1.25%			W.178.411 N.178.441	
CHAINAGE	15+430	15+440	15+460	15+480	15+500	15+520	15+540	15+560	15+580	15+600	15+620	15+640	15+660	15+680

NO	Date	By	REVISIONS	MANU CAD
	08/01/21	D.S.W.	ISSUED FOR CONSTRUCTION	
	30/06/20	D.S.W.	ISSUED FOR TENDER	

Design	D.S.W.	Ch'kd	R.I.R.	Date JUNE, 2020
Drawn	S.J.	Ch'kd	R.I.R.	

Scale 1:500 Horiz. (−10 −5 0 10)
1:50 Vert. (−1.0 −0.5 0 1.0)

References

REGIONAL

Field Notes

SEE COVER SHEET FOR REGIONAL ACCEPTANCE

Stamp: REGISTERED PROFESSIONAL ENGINEER R.I.ROOK 08/01/21 PROVINCE OF ONTARIO

wsp

Halton REGION

TITLE

PROPOSED CONSTRUCTION
WILLIAM HALTON PKWY (REG. RD. 40)
FROM 30m W. OF FOURTH LINE
TO NEYAGAWA BOULEVARD (REG. RD. 4)
STA. 15+430 TO STA. 15+680
IN THE TOWN OF OAKVILLE

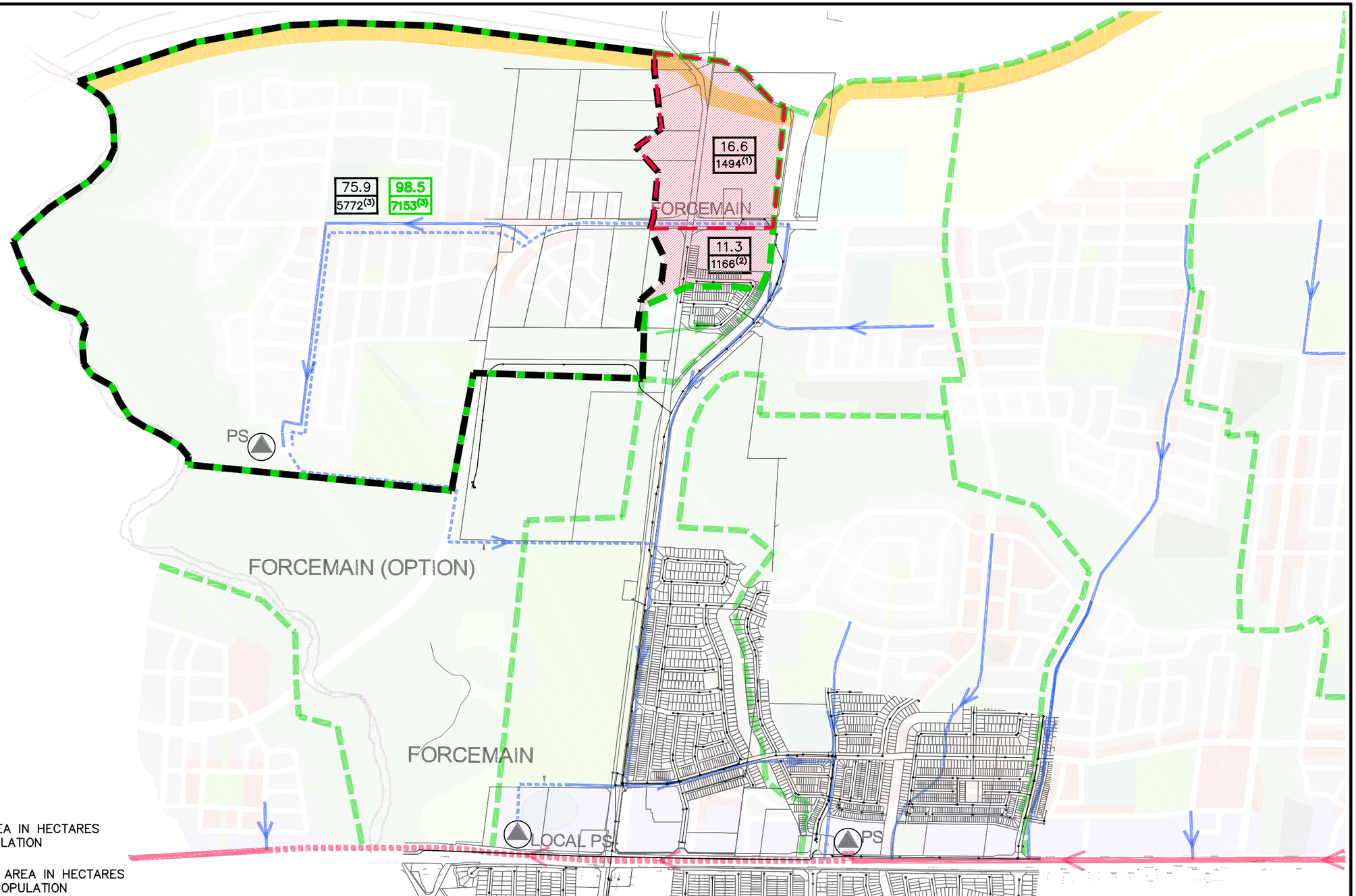
Consultant File №	Regional Drawing №
3215096	
CONTRACT № R–2263E–20	Drawing № SHEET 28 OF 57

R–2263E–20 28 of 57

DRAWING: S:\3215096\DWGFILES\3215096-400-16 TO 31-NEW CONSTRUCTION.DWG
LAYOUT TAB: SHT 28
DRAWN BY:
REVISED BY:
LAST SAVED: 02/03/2021 Time: 04:01:18 PM

ATTACHMENT #5

Revised Wastewater Drainage Area Plan, Figure 1



NOTES:

(1) AREA AND POPULATION TAKEN FROM DAVIS–MINARDI EIR/FSS FIGURE 9.1

(2) AREA AND POPULATION IS THE SUM OF AREAS SOUTH OF BURNHAMTHORPE ROAD TAKEN FROM DAVIS–MINARDI EIR/FSS FIGURE 9.1

(3) EQUIVALENT POPULATION IS BASED ON POPULATION DENSITIES IN THE ASP

40.0 / 90	ASP DEVELOPABLE AREA IN HECTARES / ASP EQUIVALENT POPULATION
40.0 / 90	REVISED DEVELOPABLE AREA IN HECTARES / REVISED EQUIVALENT POPULATION
	SUBJECT BOUNDARY
	ASP WASTEWATER DRAINAGE BOUNDARY
	REVISED WASTEWATER DRAINAGE BOUNDARY
	AREA REMOVED FROM ASP BOUNDARY

PROJECT TITLE

ARGO NEYAGAWA
NORTH OAKVILLE EAST AREA SERVICING PLAN UPDATE

DRAWING TITLE

SANITARY DRAINAGE PLAN

TRAFALGAR ENGINEERING
#1-481 MORDEN ROAD, OAKVILLE, ON, L6K 3W6
www.trafalgareng.com

DESIGN BY	JN	SCALE	NTS	DRAWING No. FIGURE 1
DRAWN BY	JN	DATE	2023/03/20	

FILENAME: P:\1805 Argo Neyagawa\04-CAD\08-ASP Update\1805F.dwg
PLOTDATE: Mar 21, 2023 - 3:52pm

From: MacKenzie, Ronald
To: James Nelson
Cc: Alam, Mustafa; Hilder, Alex; D"Aurizio, Anthony
Subject: RE: Argo Neyagawa and Burnhamthorpe
Date: August 24, 2023 3:03:14 PM
Attachments: image001.png

Hi James,

Regional staff have reviewed your request for revising the Area Servicing Plan according to the details outlined in your Technical Brief and are acceptable with your proposal. Please be advised that your Technical Brief will be considered as an informal revision/addendum to this ASP and may be issued to the public if requested in the future by other parties.

Thanks,

Ron

Ronald MacKenzie
Development Engineer (South)
Planning Services
Legislative & Planning Services
Halton Region
905-825-6000, ext. 7628 | 1-866-442-5866

From: James Nelson <jnelson@trafalgareng.com>
Sent: Tuesday, April 4, 2023 12:06 PM
To: MacKenzie, Ronald <Ronald.MacKenzie@halton.ca>
Subject: Argo Neyagawa and Burnhamthorpe

Hi Ron,

I hope you're keeping well! A while ago we chatted about our office preparing a technical brief to update the North Oakville ASP such that the Argo lands at NW corner of Burnhamthorpe and Neyagawa connect directly to the existing gravity sewer there instead draining to the future pumping station south-west of the site. We prepared a brief and Argo has given us the go ahead to submit it to you. As such—please see attached technical brief for your review and (hopefully) approval.

Please let us know if anything further is required.

James

TRAFALGAR ENGINEERING

www.trafalgareng.com/

James Nelson, P.Eng.
Principal
Design Services
#1 - 481 Morden Road
Oakville, Ontario, L6K 3W6
O: (905) 338-3366 ext. 136
E: jnelson@trafalgareng.com

TRAFALGAR ENGINEERING

Prepared By: JN
Checked By: JN
Project No. : 1805

SANITARY SEWER DESIGN SHEET

Regional Municipality of Halton
PER AREA SERVICING PLAN

Project Name : Argo EIRFSS
Municipal Number:
Date: 2023-12-04
Sheet: 1 of 1

LOCATION	FROM MH	TO MH	TRIBUTARY AND FLOW DATA: Tributary Area: Residential Area (ha)	Residential Density (ppha)	ICI Area (ha)	ICI Density (ppha)	Total (ha)	Population Tributary: Res (pers.)	ICI (pers.)	Total (pers.)	Average Demand: Res (L/cap. Day)	ICI (L/cap. Day)	Incr. Avg. Q (L/s)	Total Avg. Q (L/s)	Peaking Factor: K_{avg}	Peaking Factor: M_{avg}	Peak Q, Q_P (L/s)	Infiltr. (L/s)	Design Flow, Q_D (L/s)	PIPE DATA: Length, L (m)	Pipe Dia., D (mm)	Slope, s (%)	Manning's Coeff., n	Full Flow Capacity, Q_F (L/s)	Velocity: Full (m/s)	Velocity: Actual (m/s)	Flow Depth, d (mm)	d/D	Type	Class
PER ASP:																														
Subtrunk 6A	6A		3.28				3.28																							
			4.51				7.79																							
			2.17				9.96																							
			18.04		2.57		30.57																							
		6B	4.76	65.90			35.33	2159	208	2367	275	275	7.5	7.5	1.0	3.53	26.6	10.1	36.7		300	0.5	0.013	71.3	0.98	1.01	152.40	0.50		
	6B		2.84				38.17																							
			6.68				44.85																							
			3.87				48.72																							
			9.61				58.33																							
			36.39				94.72																							
		6C	0.00	41.01			94.72	2436	0	4803	275	275	7.8	15.3	1.00	3.26	49.9	27.1	76.9		375	0.5	0.013	129.3	1.13	1.20	209.55	0.55		
	6C		3.82				98.54																							
			1.80				100.34																							
			2.19				102.53																							
			2.39				104.92																							
			11.39	66.98	2.86	81	119.17	763	232																					
Argo Neyagawa (Subject Lands)					**9.13**	**43**	**128.30**		**393**																					
		6D	12.39	109.65	35.06	44	175.75	3307	1541	11038	275	275	19.8	35.1	0.95	2.77	97.2	50.3	147.5		450	0.5	0.013	210.3	1.28	1.41	278.89	0.61		
TRIBUTARY AREA TOTAL																														

Notes:
1) Pipe diameter is nominal
2) Capacity and velocity are based on Imperial I.D. (Nom. Dia x 25.4/25)
3) Weighted 'Population Densities per MMM Group Design Sheet (North Oakville ASP)

Peaking Factor $M = K_{avg} \times (1+14 / (4+P^{1/2}))$
Where P is Total population in thousands
$K_{avg} = (A_R + 0.8 \times A_{ICI}) / (A_{Total})$
Infiltration = 0.286 L/ha/s

Full Flow Capacity (Manning's Equation), Q_F
$Q_F = (1/n) \times A \times R^{2/3} \times s^{1/2}$
$= (1/n) \times 311.7 \times D^{8/3} \times s^{1/2}$

TRAFALGAR ENGINEERING

Prepared By: JN
Checked By: JN
Project No. : 1805

SANITARY SEWER DESIGN SHEET

Regional Municipality of Halton
REVISED PER ARGO EIRFSS

Project Name : Argo EIRFSS
Municipal Number:
Date: 2023-12-04
Sheet: 1 of 1

			TRIBUTARY AND FLOW DATA																	PIPE DATA								
			Tributary Area					Population Tributary			Average Demand				Peaking Factor									Velocity					
			Residential		ICI																							
LOCATION	FROM MH	TO MH	Area (ha)	Density (ppha)	Area (ha)	Density (ppha)	Total (ha)	Res (pers.)	ICI (pers.)	Total (pers.)	Res (L/cap. Day)	ICI (L/cap. Day)	Incr. Avg. Q (L/s)	Total Avg. Q (L/s)	K_{avg}	M_{avg}	Peak Q, Q_P (L/s)	Infiltr. (L/s)	Design Flow, Q_D (L/s)	Length, L (m)	Pipe Dia., D (mm)	Slope, s (%)	Manning's Coeff., n	Full Flow Capacity, Q_F (L/s)	Full (m/s)	Actual (m/s)	Flow Depth, d (mm)	d/D	Type	Class
REVISED (ARGO EIRFSS):																													
Subtrunk 6A	6A		3.28				3.28																						
			4.51				7.79																						
			2.17				9.96																						
			18.04		2.57		30.57																						
		6B	4.76	65.90			35.33	2159	208	2367	275	275	7.5	7.5	1.0	3.53	26.6	10.1	36.7		300	0.5	0.013	71.3	0.98	1.01	152.40	0.50		
	6B		2.84				38.17																						
			6.68				44.85																						
			3.87				48.72																						
			9.61				58.33																						
			36.39				94.72																						
		6C	0.00	41.01			94.72	2436	0	4803	275	275	7.8	15.3	1.00	3.26	49.9	27.1	76.9		375	0.5	0.013	129.3	1.13	1.20	209.55	0.55		
	6C		3.82				98.54																						
			1.80				100.34																						
			2.19				102.53																						
			2.39				104.92																						
			11.39	66.98	2.86	81	119.17	763	232																				
Argo Neyagawa (Subject Lands)			**9.13**	**166.32**			**128.30**	**1519**																					
		6D	12.39	109.65	35.06	63	175.75	2477	2193	11986	275	275	22.9	38.2	1.0	2.73	104.2	50.3	154.5		450	0.5	0.013	210.3	1.28	1.42	288.04	0.63		
TRIBUTARY AREA TOTAL																													

Notes:
1) Pipe diameter is nominal
2) Capacity and velocity are based on Imperial I.D. (Nom. Dia x 25.4/25)
3) Population Densities per MMM Group Design Sheet (North Oakville ASP)
4) Argo Development results in 9.1 ha reduction in ICI area and corresponding increase in residential. Weighted population density is 166.32 ppha for Argo lands based on 135 ppha medium density (Towns) and 285 ppha mixed use block.

Peaking Factor $M = K_{avg} \times (1+14 / (4+P^{1/2}))$
Where P is Total population in thousands
$K_{avg} = (A_R + 0.8 \times A_{ICI}) / (A_{Total})$
Infiltration = 0.286 L/ha/s

Full Flow Capacity (Manning's Equation), Q_F
$Q_F = (1/n) \times A \times R^{2/3} \times s^{1/2}$
$= (1/n) \times 311.7 \times D^{8/3} \times s^{1/2}$

TRAFALGAR ENGINEERING LTD.

ESTIMATED PROPOSED SANITARY FLOW

Project: Argo Neyagawa
Desc: Draft Plan of Subdivision

Project No.: 1805
Prepared By: AJP
Checked By: NAS

Residential

Land Use / Occupancy Type	Area (ha)	Population Density (pers/ha)	Eq. Population (cap.)	Per Cap. Demand (L/cap. Day)	Average Daily Dry Weather Flow (L/s)
Block 1 (Medium Density)	1.60	135.0	216	275	0.7
Block 2 (Mixed Use)	1.64	285.0	467	275	1.5
Block 3 (Medium Density)	1.74	135.0	235	275	0.7
Block 4 (Medium Density)	1.70	135.0	230	275	0.7
Block 5 (Medium Density)	1.15	135.0	155	275	0.5
TOTAL	**7.83**		**1303**		**4.1**

Industrial / Commercial / Institutional

Land Use / Occupancy Type	Area (ha)	Population Density (pers/ha)	Eq. Population (cap.)	Per Cap. Demand (L/Ha. Day)	Average Daily Dry Weather Flow (L/s)
TOTAL	**0.000**		**0**		**0.0**

Residential Peaking Factor:	3.72	
ICI Peaking Factor:	4.50	
Include ICI Peaking?	No	
Tributary Area:	9.14	(ha)
Infiltration Allowance:	0.29	(L/s ha)
Foundation Drain Allowance:	0.00	(L/s ha)
Residential Average Flow:	6.8	(L/s)
ICI Average Flow:	0.0	(L/s)
Groundwater Discharge:	0.0	(L/s)
Total Average Flow:	**6.8**	**(L/s)**
Residential Peak Flow:	18.1	(L/s)
ICI Peak Flow:	0.0	(L/s)
Groundwater Discharge:	0.0	(L/s)
Total Peak Flow:	**18.1**	**(L/s)**

TRAFALGAR ENGINEERING

Prepared By: AJP
Checked By: NAS
Project No. : 1805

SANITARY SEWER DESIGN SHEET
Regional Municipality of Halton

Project Name : ARGO Neyagawa
Municipal Number:
Date: 2023-06-08
Sheet: 1 of 1

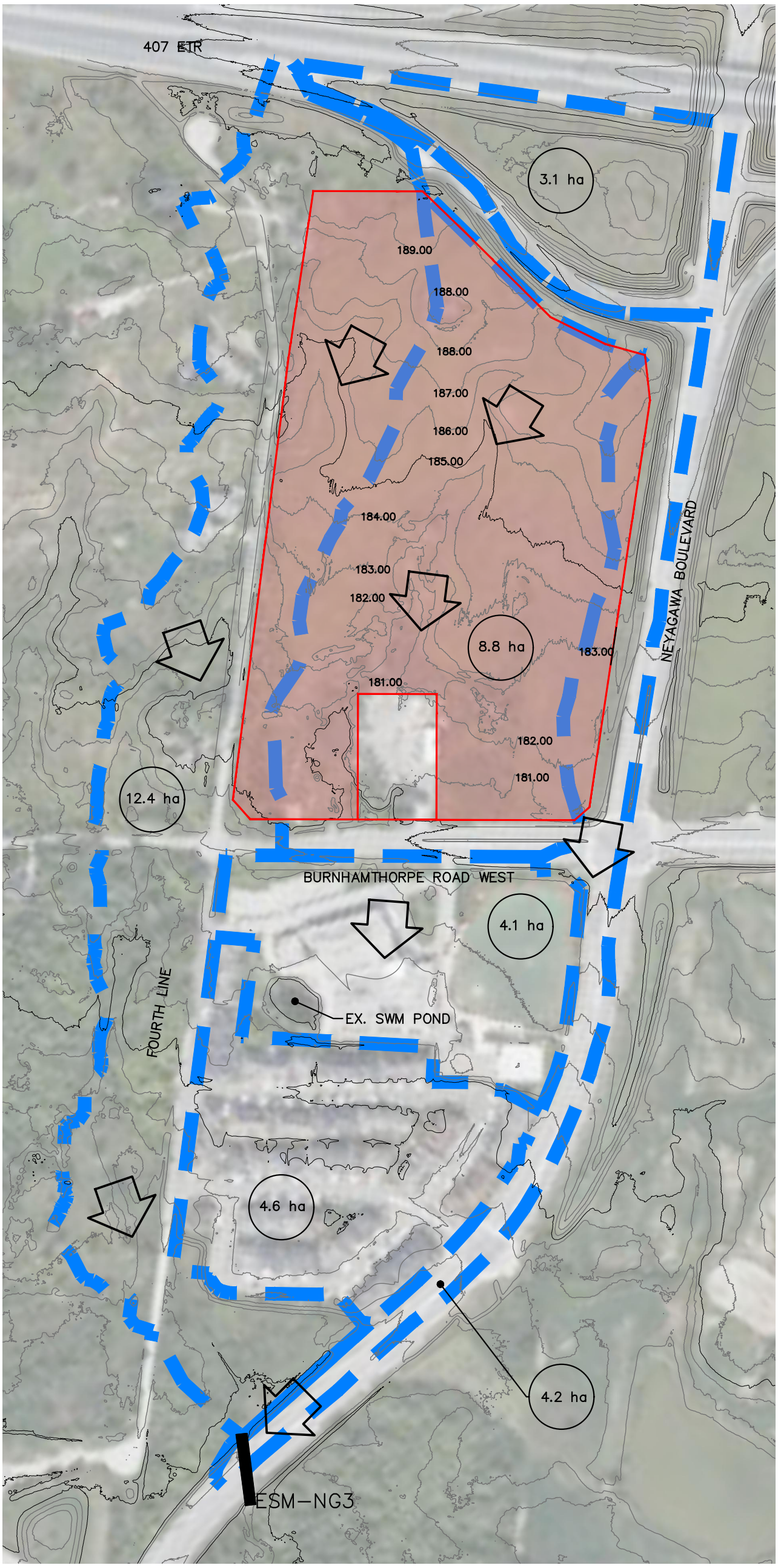
			TRIBUTARY AND FLOW DATA																PIPE DATA										
			Tributary Area					Population Tributary			Average Demand				Peaking Factor									Full Flow	Velocity					
			Residential		ICI												Peak Q,		Design					Capacity,			Flow			
LOCATION	FROM MH	TO MH	Area (ha)	Density (ppha)	Area (ha)	Density (ppha)	Total (ha)	Res (pers.)	ICI (pers.)	Total (pers.)	Res (L/cap. Day)	ICI (L/cap. Day)	Incr. Avg. Q (L/s)	Total Avg. Q (L/s)	K_{avg}	M_{avg}	Q_P (L/s)	Infiltr. (L/s)	Flow, Q_D (L/s)	Length, L (m)	Pipe Dia., D (mm)	Slope, s (%)	Manning's Coeff., n	Q_F (L/s)	Full (m/s)	Actual (m/s)	Depth, d (mm)	d/D	Type	Class
Street 'A' Infiltration			0.24				0.24	0		0			0.0	0.0	1.0	4.50	0.0	0.1	0.1										
Block 05 (Medium Density - Townhouse)			1.14	135			1.38	154		154	275		0.5	0.5	1.0	4.19	2.1	0.4	2.4										
Block 03 (Medium Density - Townhouse)	MH8A	MH7A	1.74	135			3.12	235		389	275		0.7	1.2	1.0	4.03	5.0	0.9	5.9	121.3	200	1.0	0.013	34.2	1.06	0.79	57	0.28	PVC	DR-35
Street 'A' Infiltration	MH7A	MH6A	0.02				3.14	0		389			0.0	1.2	1.0	4.03	5.0	0.9	5.9	8.8	200	1.0	0.013	34.2	1.06	0.79	57	0.28	PVC	DR-35
Street 'A' Infiltration	MH6A	MH5A	0.02				3.16	0		389			0.0	1.2	1.0	4.03	5.0	0.9	5.9	8.8	200	1.0	0.013	34.2	1.06	0.79	57	0.28	PVC	DR-35
Street 'A' Infiltration			0.20				3.36	0		389			0.0	1.2	1.0	4.03	5.0	1.0	5.9										
Block 04 (Medium Density - Townhouse)	MH5A	MH4A	1.70	135			5.06	230		619	275		0.7	2.0	1.0	3.92	7.7	1.4	9.2	123.3	200	1.4	0.013	40.5	1.25	1.03	65	0.32	PVC	DR-35
Street 'B' Infiltration			0.25				5.31	0		619			0.0	2.0	1.0	3.92	7.7	1.5	9.3										
Street 'B' Infiltration			0.28				5.59	0		619			0.0	2.0	1.0	3.92	7.7	1.6	9.3										
Street 'A' Infiltration	MH4A	MH3A	0.12				5.71	0		619			0.0	2.0	1.0	3.92	7.7	1.6	9.4	78.9	200	1.5	0.013	41.9	1.29	1.05	65	0.32	PVC	DR-35
Street 'A' Infiltration			0.16				5.87								1.0	4.50		1.7											
Block 01 (Medium Density - Townhouse)	MH3A	MH2A	1.61	135			7.48	218		837	275		0.7	2.7	1.0	3.85	10.3	2.1	12.4	90.0	200	1.5	0.013	41.9	1.29	1.14	75.18	0.37	PVC	DR-35
Street 'A' Infiltration			0.02				7.50	0		837			0.0	2.7	1.0	3.85	10.3	2.1	12.4										
Block 02 (Mixed Used - Condo and Townhouse)	MH2A	EXMH1A	1.64	280			9.14	460		1297	275		1.5	4.1	1.0	3.72	15.4	2.6	18.0	10.5	200	1.5	0.013	41.9	1.29	1.27	91.44	0.45	PVC	DR-35
TRIBUTARY AREA TOTAL			9.14				**9.14**	1297	0	**837**																			

Notes:
1) Pipe diameter is nominal
2) Capacity and velocity are based on Imperial I.D. (Nom. Dia x 25.4/25)

Peaking Factor $M = K_{avg} \times (1+14 / (4+P^{1/2}))$
Where P is Total population in thousands
$K_{avg} = (A_R + 0.8 \times A_{ICI}) / (A_{Total})$
Infiltration = 0.286 L/ha/s

Full Flow Capacity (Manning's Equation), Q_F
$Q_F = (1/n) \times A \times R^{2/3} \times s^{1/2}$
$= (1/n) \times 311.7 \times D^{8/3} \times s^{1/2}$

APPENDIX ‘D’



LEGEND

EXISTING DRAINAGE AREA

SUBJECT LANDS

ESM–NG3 CULVERT

EXISTING OVERLAND FLOW ROUTE

CONSULTANTS

JENNIFER LAWRENCE & ASSOCIATES
ENVIRONMENTAL PLANNING PROJECT MANAGEMENT

DS

TRAFALGAR ENGINEERING

KORSIAK Urban Planning

BURNSIDE

BEACON ENVIRONMENTAL

PROJECT TITLE

ARGO NEYAGAWA EIR/FSS ADDENDUM

DRAWING TITLE

EXISTING STORM DRAINAGE PATTERN

DESIGN BY	AJP	SCALE	1:3500	DRAWING No.	FIG. 5.2
DRAWN BY	AJP	DATE	2023/11/17		

FILENAME: P:\1805 Argo Neyagawa\04-CAD\06-EIRFSS\1805FIGURES.dwg
PLOTDATE: Dec 13, 2023 - 4:38pm

TRAFALGAR ENGINEERING

Prepared By: NAS
Checked By:
Project No. : 1805

STORM SEWER DESIGN SHEET

Town of Oakville
5-Year Storm

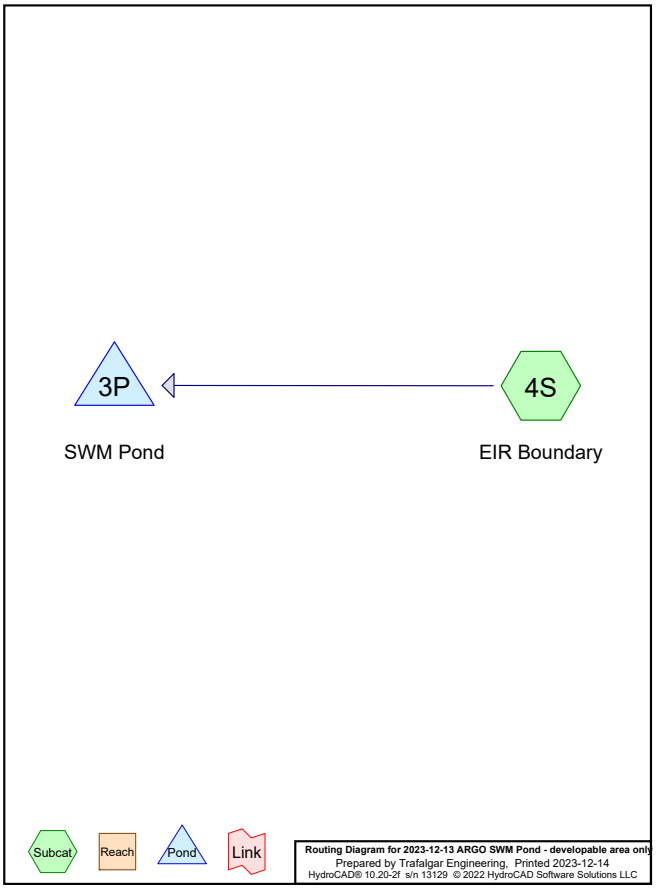
Project Name : Argo Neyagawa
Municipal Number:
Date: 12/6/2023
Sheet: 1 of 1

LOCATION	FROM MH	TO MH	DRAINAGE AREA				FLOW			SEWER DESIGN				PIPE HYDRAULICS					
			Area, A (ha)	Runoff Coeff., C	A x C (ha)	Accum. A x C (ha)	Time of Conc., T_c (min)	Intensity, I (mm/h)	Expected Flow, Q (L/s)	Length, L (m)	Gradient, s (%)	Pipe Dia., D (mm)	Manning's Coeff., n	Full Flow Capacity, Q_F (L/s)	Full Flow Velocity, V_F (m/s)	d/D	Actual Velocity, V (m/s)	Time of Flow (min)	Q/Q_F
105 (BLOCK 5)			1.19	0.90	1.071														
106 (STREET A)	MH13	MH12	0.16	0.90	0.144	1.215	10.00	114.2	**386**	30.2	1.0	525	0.013	**446**	2.00	0.71	2.27	0.22	0.86
107 (STREET A)	MH12	MH11	0.15	0.90	0.135	1.350	10.22	112.9	**423**	89.9	1.0	525	0.013	**449**	2.01	0.77	2.29	0.65	0.94
	MH11	MH10				1.350	10.88	109.1	**409**	11.1	1.0	525	0.013	**446**	2.00	0.75	2.28	0.08	0.92
	MH10	MH9				1.350	10.96	108.7	**408**	11.1	1.0	525	0.013	**446**	2.00	0.75	2.27	0.08	0.91
104 (BLOCK 4)	MH9	MH8	1.78	0.90	1.602	2.952	11.04	108	**888**	93.4	1.54	675	0.013	**1088**	2.95	0.68	3.32	0.47	0.82
108 (STREET A)	MH8	MH7	0.17	0.90	0.153	3.105	11.51	106	**912**	30.8	2.51	675	0.013	**1389**	3.76	0.59	4.02	0.13	0.66
109 (STREET B)	MH14	MH7	0.21	0.90	0.189	0.189	10.00	114	**60**	89.9	0.76	300	0.013	**88**	1.21	0.60	1.31	1.14	0.68
110 (STREET B)			0.23	0.90	0.207														
103 (BLOCK 3)	MH16	MH15	1.77	0.90	1.593	1.800	10.00	114	**571**	21.6	0.74	675	0.013	**754**	2.04	0.65	2.25	0.16	0.76
	MH15	MH7				1.800	10.16	113	**566**	91.0	0.75	675	0.013	**759**	2.06	0.64	2.27	0.67	0.75
111 (STREET A)	MH7	MH6	0.10	0.90	0.090	5.094	11.63	105	**1488**	67.3	0.74	900	0.013	**1625**	2.47	0.75	2.82	0.40	0.92
	MH6	MH3				5.094	12.03	103	**1459**	6.4	1.1	900	0.013	**1935**	2.95	0.64	3.29	0.03	0.75
102 (BLOCK 2)			1.64	0.90	1.476														
112 (STREET A)	MH5	MH4	0.14	0.90	0.126	1.602	10.00	114	**508**	64.5	0.74	600	0.013	**551**	1.89	0.75	2.16	0.50	0.92
	MH4	MH3				1.602	10.50	111.27	**495**	5.3	1.33	600	0.013	**739**	2.53	0.59	2.76	0.03	0.67
101 (BLOCK 1)	MH3	MH2	1.59	0.90	1.431	6.525	12.07	102.98	**1867**	83.3	0.74	1050	0.013	**2451**	2.74	0.65	3.03	0.46	0.76
	MH2	MH1				6.525	12.52	100.81	**1827**	9.6	0.83	1050	0.013	**2595**	2.90	0.61	3.20	0.05	0.70
	MH1	POND HW				6.525	12.57	101	**1823**	10.1	0.75	1050	0.013	**2467**	2.76	0.63	3.07	0.05	0.74
SEWER EXT ON FOURTH LINE	*POND OUT*	*EX MH 22*							**163**	200.0	1.0	450	0.013	**297.45**	1.81	0.52	1.89	1.76	0.55

Notes:
1) Pipe diameter is nominal
2) Capacity and velocity are based on Imperial I.D. (Nom. Dia x 25.4/25)
3) Time of Flow is based on Actual Velocity

Intensity, $I = A / (T_c + B)^C$ where:
A= 1170
B= 5.8
C= 0.843
t_c= Time of Concentration in minutes

Expected Flow, $Q = 2.778 \times C \times I \times A / 1000$
Full Flow Capacity (Manning's Equation), Q_F
$Q_F = (1/n) \times A \times R^{2/3} \times s^{1/2}$
$= (1/n) \times 311.7 \times D^{8/3} \times s^{1/2}$



Project Notes

Copied 6 events from ON Oakville 24hr storm

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (mm)	AMC
1	2-Year	ON Oakville 24hr	2-Year	Default	24.00	1	48	2
2	5-Year	ON Oakville 24hr	5-Year	Default	24.00	1	60	2
3	10-Year	ON Oakville 24hr	10-Year	Default	24.00	1	70	2
4	25-Year	ON Oakville 24hr	25-Year	Default	24.00	1	82	2
5	50-Year	ON Oakville 24hr	50-Year	Default	24.00	1	89	2
6	100-Year	ON Oakville 24hr	100-Year	Default	24.00	1	97	2
7	Custom	ON Oakville 24hr	2-Year	Default	24.00	1	25	2

Area Listing (all nodes)

Area (hectares)	CN	Description (subcatchment-numbers)
8.6800	98	(4S)
1.5500	74	(4S)
10.2300	**94**	**TOTAL AREA**

Soil Listing (all nodes)

Area (hectares)	Soil Group	Subcatchment Numbers
0.0000	HSG A	
0.0000	HSG B	
0.0000	HSG C	
0.0000	HSG D	
10.2300	Other	4S
10.2300		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (hectares)	HSG-B (hectares)	HSG-C (hectares)	HSG-D (hectares)	Other (hectares)	Total (hectares)	Ground Cover	Subcatchment Numbers
0.0000	0.0000	0.0000	0.0000	10.2300	10.2300		4S
0.0000	**0.0000**	**0.0000**	**0.0000**	**10.2300**	**10.2300**	**TOTAL AREA**	

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: EIR Boundary Runoff Area=10.2300 ha 84.85% Impervious Runoff Depth=33 mm
Tc=10.0 min CN=94 Runoff=1.727 m³/s 3.383 Ml

Pond 3P: SWM Pond Peak Elev=177.852 m Storage=2,518.3 m³ Inflow=1.727 m³/s 3.383 Ml
Primary=0.020 m³/s 3.128 Ml Secondary=0.000 m³/s 0.003 Ml Outflow=0.021 m³/s 3.131 Ml

Total Runoff Area = 10.2300 ha Runoff Volume = 3.383 Ml Average Runoff Depth = 33 mm
15.15% Pervious = 1.5500 ha 84.85% Impervious = 8.6800 ha

Summary for Subcatchment 4S: EIR Boundary

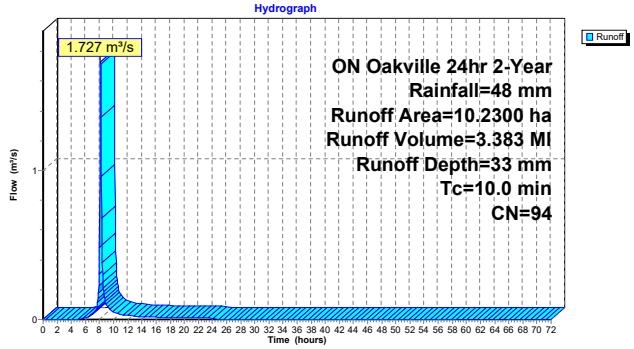
Runoff = 1.727 m³/s @ 8.14 hrs, Volume= 3.383 Ml, Depth= 33 mm
Routed to Pond 3P : SWM Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
ON Oakville 24hr 2-Year Rainfall=48 mm

	Area (ha)	CN	Description
*	8.6800	98	
*	1.5500	74	
	10.2300	94	Weighted Average
	1.5500		15.15% Pervious Area
	8.6800		84.85% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 4S: EIR Boundary



Hydrograph for Subcatchment 4S: EIR Boundary

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	53.00	48	33	0.000
1.00	1	0	0.000	54.00	48	33	0.000
2.00	1	0	0.000	55.00	48	33	0.000
3.00	2	0	0.000	56.00	48	33	0.000
4.00	3	0	0.000	57.00	48	33	0.000
5.00	4	0	0.002	58.00	48	33	0.000
6.00	5	0	0.010	59.00	48	33	0.000
7.00	8	1	0.030	60.00	48	33	0.000
8.00	22	10	**0.482**	61.00	48	33	0.000
9.00	37	23	**0.098**	62.00	48	33	0.000
10.00	40	25	0.049	63.00	48	33	0.000
11.00	41	26	0.034	64.00	48	33	0.000
12.00	42	27	0.026	65.00	48	33	0.000
13.00	43	28	0.022	66.00	48	33	0.000
14.00	44	29	0.019	67.00	48	33	0.000
15.00	44	30	0.016	68.00	48	33	0.000
16.00	45	30	0.015	69.00	48	33	0.000
17.00	46	31	0.013	70.00	48	33	0.000
18.00	46	31	0.012	71.00	48	33	0.000
19.00	46	31	0.011	72.00	48	33	0.000
20.00	47	32	0.011				
21.00	47	32	0.010				
22.00	48	32	0.009				
23.00	48	33	0.009				
24.00	**48**	**33**	0.008				
25.00	48	33	0.000				
26.00	48	33	0.000				
27.00	48	33	0.000				
28.00	48	33	0.000				
29.00	48	33	0.000				
30.00	48	33	0.000				
31.00	48	33	0.000				
32.00	48	33	0.000				
33.00	48	33	0.000				
34.00	48	33	0.000				
35.00	48	33	0.000				
36.00	48	33	0.000				
37.00	48	33	0.000				
38.00	48	33	0.000				
39.00	48	33	0.000				
40.00	48	33	0.000				
41.00	48	33	0.000				
42.00	48	33	0.000				
43.00	48	33	0.000				
44.00	48	33	0.000				
45.00	48	33	0.000				
46.00	48	33	0.000				
47.00	48	33	0.000				
48.00	48	33	0.000				
49.00	48	33	0.000				
50.00	48	33	0.000				
51.00	48	33	0.000				
52.00	48	33	0.000				

Summary for Pond 3P: SWM Pond

Inflow Area = 10.2300 ha, 84.85% Impervious, Inflow Depth = 33 mm for 2-Year event
Inflow = 1.727 m³/s @ 8.14 hrs, Volume= 3.383 Ml
Outflow = 0.021 m³/s @ 13.27 hrs, Volume= 3.131 Ml, Atten= 99%, Lag= 307.8 min
Primary = 0.020 m³/s @ 13.27 hrs, Volume= 3.128 Ml
Secondary = 0.000 m³/s @ 13.27 hrs, Volume= 0.003 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 177.852 m @ 13.27 hrs Storage= 2,518.3 m³

Plug-Flow detention time= 1,408.0 min calculated for 3.131 Ml (93% of inflow)
Center-of-Mass det. time= 1,357.2 min (1,954.8 - 597.6)

Volume	Invert	Avail.Storage	Storage Description
#1	177.250 m	11,653.0 m³	**Custom Stage Data** Listed below

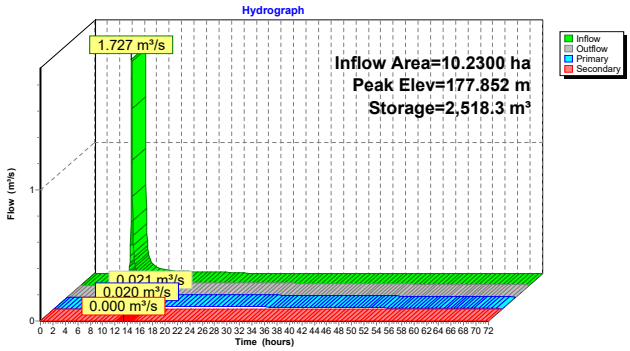
Elevation (meters)	Cum.Store (cubic-meters)
177.250	0.0
177.500	929.0
177.680	1,693.0
177.750	2,015.0
178.000	3,243.0
178.250	4,537.0
178.500	5,873.0
178.750	7,253.0
179.000	8,677.0
179.250	10,143.0
179.500	11,653.0

Device	Routing	Invert	Outlet Devices
#1	Primary	177.250 m	**115 mm Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Secondary	177.850 m	**Special & User-Defined** Head (meters) 0.000 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900 1.000 1.500 2.000 2.500 Disch. (m³/s) 0.00000 0.01700 0.03800 0.05900 0.08000 0.10200 0.12300 0.14300 0.16400 0.18500 0.20600 0.31200 0.41900 0.52500

Primary OutFlow Max=0.020 m³/s @ 13.27 hrs HW=177.852 m (Free Discharge)
↑**1=Orifice/Grate** (Orifice Controls 0.020 m³/s @ 1.96 m/s)

Secondary OutFlow Max=0.000 m³/s @ 13.27 hrs HW=177.852 m (Free Discharge)
↑**2=Special & User-Defined** (Custom Controls 0.000 m³/s)

Pond 3P: SWM Pond



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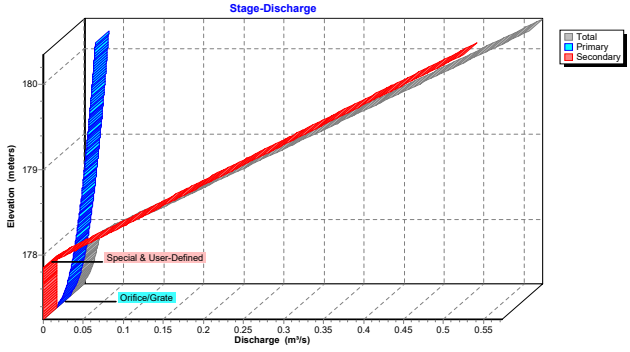
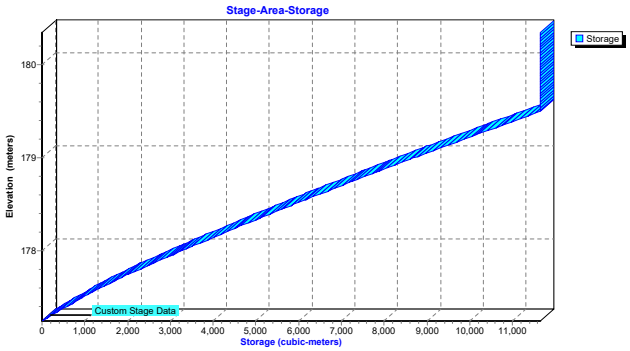


Pond 3P: SWM Pond



Hydrograph for Pond 3P: SWM Pond

Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Outflow (m³/s)	Primary (m³/s)	Secondary (m³/s)
0.00	0.000	0.0	177.250	0.000	0.000	0.000
2.50	0.000	0.0	177.250	0.000	0.000	0.000
5.00	0.002	1.9	177.251	0.000	0.000	0.000
7.50	**0.065**	162.1	177.294	0.001	0.001	0.000
10.00	**0.049**	2,399.5	177.828	0.020	0.020	0.000
12.50	0.024	**2,514.2**	**177.852**	**0.021**	**0.020**	**0.000**
15.00	0.016	**2,504.4**	**177.850**	**0.020**	**0.020**	**0.000**
17.50	0.013	2,451.8	177.839	0.020	0.020	0.000
20.00	0.011	2,375.8	177.823	0.020	0.020	0.000
22.50	0.009	2,286.3	177.805	0.019	0.019	0.000
25.00	0.000	2,164.3	177.780	0.019	0.019	0.000
27.50	0.000	1,996.6	177.746	0.018	0.018	0.000
30.00	0.000	1,835.4	177.711	0.018	0.018	0.000
32.50	0.000	1,681.0	177.677	0.017	0.017	0.000
35.00	0.000	1,533.6	177.642	0.016	0.016	0.000
37.50	0.000	1,393.4	177.609	0.015	0.015	0.000
40.00	0.000	1,260.6	177.578	0.014	0.014	0.000
42.50	0.000	1,135.0	177.549	0.014	0.014	0.000
45.00	0.000	1,016.6	177.521	0.013	0.013	0.000
47.50	0.000	905.6	177.494	0.012	0.012	0.000
50.00	0.000	802.5	177.466	0.011	0.011	0.000
52.50	0.000	707.8	177.440	0.010	0.010	0.000
55.00	0.000	621.3	177.417	0.009	0.009	0.000
57.50	0.000	543.2	177.396	0.008	0.008	0.000
60.00	0.000	473.4	177.377	0.007	0.007	0.000
62.50	0.000	411.8	177.361	0.006	0.006	0.000
65.00	0.000	358.4	177.346	0.005	0.005	0.000
67.50	0.000	313.9	177.334	0.004	0.004	0.000
70.00	0.000	277.5	177.325	0.004	0.004	0.000

Stage-Discharge for Pond 3P: SWM Pond

Elevation (meters)	Discharge (m³/s)	Primary (m³/s)	Secondary (m³/s)	Elevation (meters)	Discharge (m³/s)	Primary (m³/s)	Secondary (m³/s)
177.250	0.000	0.000	0.000	179.900	0.474	0.044	0.430
177.300	0.002	0.002	0.000	179.950	0.485	0.045	0.440
177.350	0.006	0.006	0.000	180.000	0.496	0.045	0.451
177.400	0.008	0.008	0.000	180.050	0.507	0.046	0.461
177.450	0.010	0.010	0.000	180.100	0.518	0.046	0.472
177.500	0.012	0.012	0.000	180.150	0.529	0.047	0.483
177.550	0.014	0.014	0.000	180.200	0.540	0.047	0.493
177.600	0.015	0.015	0.000	180.250	0.551	0.047	0.504
177.650	0.016	0.016	0.000	180.300	0.562	0.048	0.514
177.700	0.017	0.017	0.000	180.350	**0.573**	**0.048**	**0.525**
177.750	0.018	0.018	0.000				
177.800	0.019	0.019	0.000				
177.850	0.020	0.020	0.000				
177.900	0.030	0.021	0.009				
177.950	0.039	0.022	0.017				
178.000	0.050	0.023	0.028				
178.050	0.062	0.024	0.038				
178.100	0.073	0.025	0.049				
178.150	0.084	0.025	0.059				
178.200	0.096	0.026	0.069				
178.250	0.107	0.027	0.080				
178.300	0.119	0.028	0.091				
178.350	0.130	0.028	0.102				
178.400	0.141	0.029	0.113				
178.450	0.153	0.030	0.123				
178.500	0.163	0.030	0.133				
178.550	0.174	0.031	0.143				
178.600	0.185	0.031	0.153				
178.650	0.196	0.032	0.164				
178.700	0.207	0.033	0.174				
178.750	0.218	0.033	0.185				
178.800	0.229	0.034	0.196				
178.850	0.240	0.034	0.206				
178.900	0.251	0.035	0.217				
178.950	0.263	0.035	0.227				
179.000	0.274	0.036	0.238				
179.050	0.285	0.036	0.248				
179.100	0.296	0.037	0.259				
179.150	0.307	0.037	0.270				
179.200	0.318	0.038	0.280				
179.250	0.329	0.038	0.291				
179.300	0.340	0.039	0.301				
179.350	0.351	0.039	0.312				
179.400	0.363	0.040	0.323				
179.450	0.374	0.040	0.333				
179.500	0.385	0.041	0.344				
179.550	0.396	0.041	0.355				
179.600	0.407	0.042	0.365				
179.650	0.418	0.042	0.376				
179.700	0.430	0.043	0.387				
179.750	0.441	0.043	0.398				
179.800	0.452	0.044	0.408				
179.850	0.463	0.044	0.419				

Stage-Area-Storage for Pond 3P: SWM Pond

Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)
177.250	0.0	178.310	4,857.6	179.370	10,867.8
177.270	74.3	178.330	4,964.5	179.390	10,988.6
177.290	148.6	178.350	5,071.4	179.410	11,109.4
177.310	223.0	178.370	5,178.3	179.430	11,230.2
177.330	297.3	178.390	5,285.2	179.450	11,351.0
177.350	371.6	178.410	5,392.0	179.470	11,471.8
177.370	445.9	178.430	5,498.9	179.490	**11,592.6**
177.390	520.2	178.450	5,605.8	179.510	**11,653.0**
177.410	594.6	178.470	5,712.7	179.530	11,653.0
177.430	668.9	178.490	5,819.6	179.550	11,653.0
177.450	743.2	178.510	5,928.2	179.570	11,653.0
177.470	817.5	178.530	6,038.6	179.590	11,653.0
177.490	891.8	178.550	6,149.0	179.610	11,653.0
177.510	971.4	178.570	6,259.4	179.630	11,653.0
177.530	1,056.3	178.590	6,369.8	179.650	11,653.0
177.550	1,141.2	178.610	6,480.2	179.670	11,653.0
177.570	1,226.1	178.630	6,590.6	179.690	11,653.0
177.590	1,311.0	178.650	6,701.0	179.710	11,653.0
177.610	1,395.9	178.670	6,811.4	179.730	11,653.0
177.630	1,480.8	178.690	6,921.8	179.750	11,653.0
177.650	1,565.7	178.710	7,032.2	179.770	11,653.0
177.670	1,650.6	178.730	7,142.6	179.790	11,653.0
177.690	1,739.0	178.750	7,253.0	179.810	11,653.0
177.710	1,831.0	178.770	7,366.9	179.830	11,653.0
177.730	1,923.0	178.790	7,480.8	179.850	11,653.0
177.750	2,015.0	178.810	7,594.8	179.870	11,653.0
177.770	2,113.2	178.830	7,708.7	179.890	11,653.0
177.790	2,211.5	178.850	7,822.6	179.910	11,653.0
177.810	2,309.7	178.870	7,936.5	179.930	11,653.0
177.830	2,408.0	178.890	8,050.4	179.950	11,653.0
177.850	2,506.2	178.910	8,164.4	179.970	11,653.0
177.870	2,604.4	178.930	8,278.3	179.990	11,653.0
177.890	2,702.7	178.950	8,392.2	180.010	11,653.0
177.910	2,800.9	178.970	8,506.1	180.030	11,653.0
177.930	2,899.2	178.990	8,620.0	180.050	11,653.0
177.950	2,997.4	179.010	8,735.6	180.070	11,653.0
177.970	3,095.6	179.030	8,852.9	180.090	11,653.0
177.990	3,193.9	179.050	8,970.2	180.110	11,653.0
178.010	3,294.8	179.070	9,087.5	180.130	11,653.0
178.030	3,398.3	179.090	9,204.8	180.150	11,653.0
178.050	3,501.8	179.110	9,322.0	180.170	11,653.0
178.070	3,605.3	179.130	9,439.3	180.190	11,653.0
178.090	3,708.8	179.150	9,556.6	180.210	11,653.0
178.110	3,812.4	179.170	9,673.9	180.230	11,653.0
178.130	3,915.9	179.190	9,791.2	180.250	11,653.0
178.150	4,019.4	179.210	9,908.4	180.270	11,653.0
178.170	4,122.9	179.230	10,025.7	180.290	11,653.0
178.190	4,226.4	179.250	10,143.0	180.310	11,653.0
178.210	4,330.0	179.270	10,263.8	180.330	11,653.0
178.230	4,433.5	179.290	10,384.6	180.350	11,653.0
178.250	4,537.0	179.310	10,505.4		
178.270	4,643.9	179.330	10,626.2		
178.290	4,750.8	179.350	10,747.0		

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: EIR Boundary Runoff Area=10.2300 ha 84.85% Impervious Runoff Depth=45 mm
Tc=10.0 min CN=94 Runoff=2.563 m³/s 4.553 Ml

Pond 3P: SWM Pond Peak Elev=178.013 m Storage=3,310.1 m³ Inflow=2.563 m³/s 4.553 Ml
Primary=0.023 m³/s 3.442 Ml Secondary=0.030 m³/s 0.813 Ml Outflow=0.053 m³/s 4.256 Ml

Total Runoff Area = 10.2300 ha Runoff Volume = 4.553 Ml Average Runoff Depth = 45 mm
15.15% Pervious = 1.5500 ha 84.85% Impervious = 8.6800 ha

Summary for Subcatchment 4S: EIR Boundary

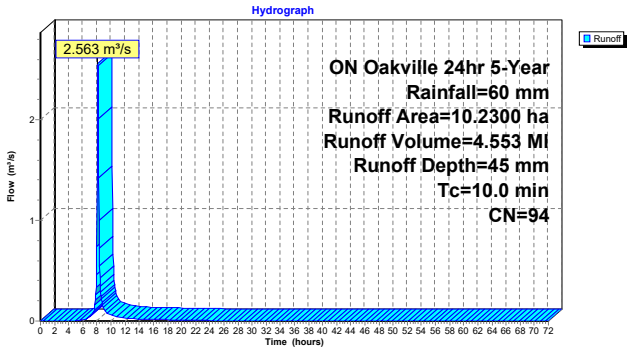
Runoff = 2.563 m³/s @ 8.14 hrs, Volume= 4.553 Ml, Depth= 45 mm
Routed to Pond 3P : SWM Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
ON Oakville 24hr 5-Year Rainfall=60 mm

	Area (ha)	CN	Description
*	8.6800	98	
*	1.5500	74	
	10.2300	94	Weighted Average
	1.5500		15.15% Pervious Area
	8.6800		84.85% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 4S: EIR Boundary



Hydrograph for Subcatchment 4S: EIR Boundary

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	53.00	60	45	0.000
1.00	1	0	0.000	54.00	60	45	0.000
2.00	1	0	0.000	55.00	60	45	0.000
3.00	2	0	0.000	56.00	60	45	0.000
4.00	3	0	0.000	57.00	60	45	0.000
5.00	4	0	0.004	58.00	60	45	0.000
6.00	6	0	0.013	59.00	60	45	0.000
7.00	9	1	0.039	60.00	60	45	0.000
8.00	29	15	**0.742**	61.00	60	45	0.000
9.00	48	33	**0.123**	62.00	60	45	0.000
10.00	51	36	0.057	63.00	60	45	0.000
11.00	53	37	0.039	64.00	60	45	0.000
12.00	54	38	0.029	65.00	60	45	0.000
13.00	55	39	0.024	66.00	60	45	0.000
14.00	56	40	0.020	67.00	60	45	0.000
15.00	56	41	0.018	68.00	60	45	0.000
16.00	57	41	0.016	69.00	60	45	0.000
17.00	58	42	0.014	70.00	60	45	0.000
18.00	58	42	0.013	71.00	60	45	0.000
19.00	59	43	0.012	72.00	60	45	0.000
20.00	59	43	0.011				
21.00	59	44	0.010				
22.00	60	44	0.010				
23.00	60	44	0.009				
24.00	**60**	**45**	0.009				
25.00	60	45	0.000				
26.00	60	45	0.000				
27.00	60	45	0.000				
28.00	60	45	0.000				
29.00	60	45	0.000				
30.00	60	45	0.000				
31.00	60	45	0.000				
32.00	60	45	0.000				
33.00	60	45	0.000				
34.00	60	45	0.000				
35.00	60	45	0.000				
36.00	60	45	0.000				
37.00	60	45	0.000				
38.00	60	45	0.000				
39.00	60	45	0.000				
40.00	60	45	0.000				
41.00	60	45	0.000				
42.00	60	45	0.000				
43.00	60	45	0.000				
44.00	60	45	0.000				
45.00	60	45	0.000				
46.00	60	45	0.000				
47.00	60	45	0.000				
48.00	60	45	0.000				
49.00	60	45	0.000				
50.00	60	45	0.000				
51.00	60	45	0.000				
52.00	60	45	0.000				

Summary for Pond 3P: SWM Pond

Inflow Area = 10.2300 ha, 84.85% Impervious, Inflow Depth = 45 mm for 5-Year event
Inflow = 2.563 m³/s @ 8.14 hrs, Volume= 4.553 Ml
Outflow = 0.053 m³/s @ 10.15 hrs, Volume= 4.256 Ml, Atten= 98%, Lag= 120.6 min
Primary = 0.023 m³/s @ 10.15 hrs, Volume= 3.442 Ml
Secondary = 0.030 m³/s @ 10.15 hrs, Volume= 0.813 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 178.013 m @ 10.15 hrs Storage= 3,310.1 m³

Plug-Flow detention time= 1,216.5 min calculated for 4.253 Ml (93% of inflow)
Center-of-Mass det. time= 1,174.0 min (1,749.9 - 575.9)

Volume	Invert	Avail.Storage	Storage Description
#1	177.250 m	11,653.0 m³	**Custom Stage Data** Listed below

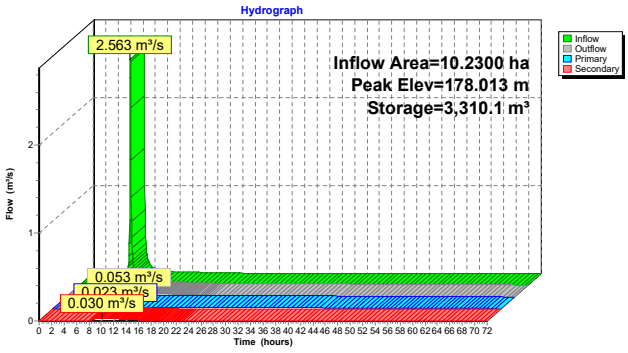
Elevation (meters)	Cum.Store (cubic-meters)
177.250	0.0
177.500	929.0
177.680	1,693.0
177.750	2,015.0
178.000	3,243.0
178.250	4,537.0
178.500	5,873.0
178.750	7,253.0
179.000	8,677.0
179.250	10,143.0
179.500	11,653.0

Device	Routing	Invert	Outlet Devices
#1	Primary	177.250 m	**115 mm Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Secondary	177.850 m	**Special & User-Defined** Head (meters) 0.000 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900 1.000 1.500 2.000 2.500 Disch. (m³/s) 0.00000 0.01700 0.03800 0.05900 0.08000 0.10200 0.12300 0.14300 0.16400 0.18500 0.20600 0.31200 0.41900 0.52500

Primary OutFlow Max=0.023 m³/s @ 10.15 hrs HW=178.013 m (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.023 m³/s @ 2.23 m/s)

Secondary OutFlow Max=0.030 m³/s @ 10.15 hrs HW=178.013 m (Free Discharge)
└**2=Special & User-Defined** (Custom Controls 0.030 m³/s)

Pond 3P: SWM Pond



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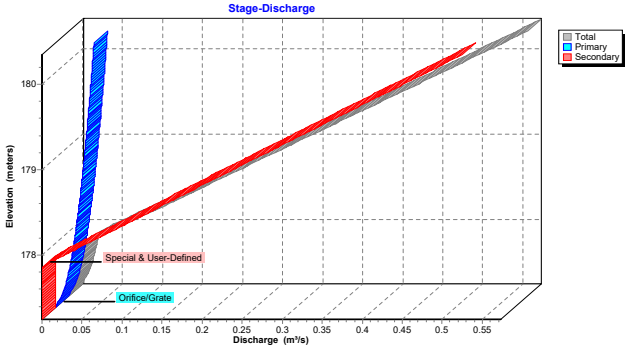

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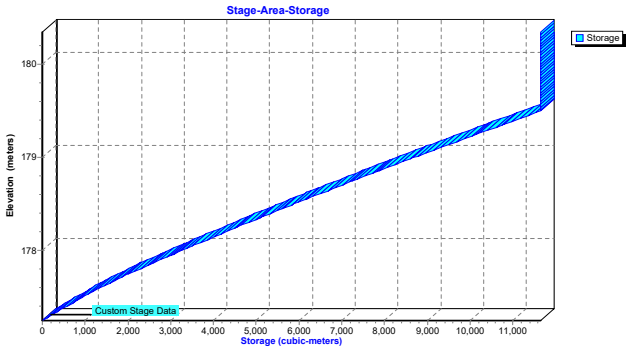


Hydrograph for Pond 3P: SWM Pond

Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Outflow (m³/s)	Primary (m³/s)	Secondary (m³/s)
0.00	0.000	0.0	177.250	0.000	0.000	0.000
2.50	0.000	0.0	177.250	0.000	0.000	0.000
5.00	0.004	4.1	177.251	0.000	0.000	0.000
7.50	**0.089**	217.0	177.308	0.002	0.002	0.000
10.00	**0.057**	**3,309.1**	**178.013**	**0.053**	**0.023**	**0.030**
12.50	0.026	**3,185.4**	**177.988**	**0.048**	**0.023**	**0.025**
15.00	0.018	2,989.3	177.948	0.039	0.022	0.017
17.50	0.014	2,810.6	177.912	0.032	0.021	0.011
20.00	0.011	2,659.7	177.881	0.026	0.021	0.005
22.50	0.009	2,537.5	177.856	0.022	0.020	0.001
25.00	0.000	2,407.5	177.830	0.020	0.020	0.000
27.50	0.000	2,231.1	177.794	0.019	0.019	0.000
30.00	0.000	2,061.0	177.759	0.019	0.019	0.000
32.50	0.000	1,897.2	177.724	0.018	0.018	0.000
35.00	0.000	1,740.2	177.690	0.017	0.017	0.000
37.50	0.000	1,590.0	177.656	0.016	0.016	0.000
40.00	0.000	1,447.0	177.622	0.015	0.015	0.000
42.50	0.000	1,311.3	177.590	0.015	0.015	0.000
45.00	0.000	1,182.9	177.560	0.014	0.014	0.000
47.50	0.000	1,061.7	177.531	0.013	0.013	0.000
50.00	0.000	947.8	177.504	0.012	0.012	0.000
52.50	0.000	841.6	177.476	0.011	0.011	0.000
55.00	0.000	743.6	177.450	0.010	0.010	0.000
57.50	0.000	653.9	177.426	0.010	0.010	0.000
60.00	0.000	572.6	177.404	0.009	0.009	0.000
62.50	0.000	499.5	177.384	0.008	0.008	0.000
65.00	0.000	434.8	177.367	0.007	0.007	0.000
67.50	0.000	378.0	177.352	0.006	0.006	0.000
70.00	0.000	330.2	177.339	0.005	0.005	0.000

Stage-Discharge for Pond 3P: SWM Pond

Elevation (meters)	Discharge (m³/s)	Primary (m³/s)	Secondary (m³/s)	Elevation (meters)	Discharge (m³/s)	Primary (m³/s)	Secondary (m³/s)
177.250	0.000	0.000	0.000	179.900	0.474	0.044	0.430
177.300	0.002	0.002	0.000	179.950	0.485	0.045	0.440
177.350	0.006	0.006	0.000	180.000	0.496	0.045	0.451
177.400	0.008	0.008	0.000	180.050	0.507	0.046	0.461
177.450	0.010	0.010	0.000	180.100	0.518	0.046	0.472
177.500	0.012	0.012	0.000	180.150	0.529	0.047	0.483
177.550	0.014	0.014	0.000	180.200	0.540	0.047	0.493
177.600	0.015	0.015	0.000	180.250	0.551	0.047	0.504
177.650	0.016	0.016	0.000	180.300	0.562	0.048	0.514
177.700	0.017	0.017	0.000	180.350	**0.573**	**0.048**	**0.525**
177.750	0.018	0.018	0.000				
177.800	0.019	0.019	0.000				
177.850	0.020	0.020	0.000				
177.900	0.030	0.021	0.009				
177.950	0.039	0.022	0.017				
178.000	0.050	0.023	0.028				
178.050	0.062	0.024	0.038				
178.100	0.073	0.025	0.049				
178.150	0.084	0.025	0.059				
178.200	0.096	0.026	0.069				
178.250	0.107	0.027	0.080				
178.300	0.119	0.028	0.091				
178.350	0.130	0.028	0.102				
178.400	0.141	0.029	0.113				
178.450	0.153	0.030	0.123				
178.500	0.163	0.030	0.133				
178.550	0.174	0.031	0.143				
178.600	0.185	0.031	0.153				
178.650	0.196	0.032	0.164				
178.700	0.207	0.033	0.174				
178.750	0.218	0.033	0.185				
178.800	0.229	0.034	0.196				
178.850	0.240	0.034	0.206				
178.900	0.251	0.035	0.217				
178.950	0.263	0.035	0.227				
179.000	0.274	0.036	0.238				
179.050	0.285	0.036	0.248				
179.100	0.296	0.037	0.259				
179.150	0.307	0.037	0.270				
179.200	0.318	0.038	0.280				
179.250	0.329	0.038	0.291				
179.300	0.340	0.039	0.301				
179.350	0.351	0.039	0.312				
179.400	0.363	0.040	0.323				
179.450	0.374	0.040	0.333				
179.500	0.385	0.041	0.344				
179.550	0.396	0.041	0.355				
179.600	0.407	0.042	0.365				
179.650	0.418	0.042	0.376				
179.700	0.430	0.043	0.387				
179.750	0.441	0.043	0.398				
179.800	0.452	0.044	0.408				
179.850	0.463	0.044	0.419				

Stage-Area-Storage for Pond 3P: SWM Pond

Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)
177.250	0.0	178.310	4,857.6	179.370	10,867.8
177.270	74.3	178.330	4,964.5	179.390	10,988.6
177.290	148.6	178.350	5,071.4	179.410	11,109.4
177.310	223.0	178.370	5,178.3	179.430	11,230.2
177.330	297.3	178.390	5,285.2	179.450	11,351.0
177.350	371.6	178.410	5,392.0	179.470	11,471.8
177.370	445.9	178.430	5,498.9	179.490	**11,592.6**
177.390	520.2	178.450	5,605.8	179.510	**11,653.0**
177.410	594.6	178.470	5,712.7	179.530	11,653.0
177.430	668.9	178.490	5,819.6	179.550	11,653.0
177.450	743.2	178.510	5,928.2	179.570	11,653.0
177.470	817.5	178.530	6,038.6	179.590	11,653.0
177.490	891.8	178.550	6,149.0	179.610	11,653.0
177.510	971.4	178.570	6,259.4	179.630	11,653.0
177.530	1,056.3	178.590	6,369.8	179.650	11,653.0
177.550	1,141.2	178.610	6,480.2	179.670	11,653.0
177.570	1,226.1	178.630	6,590.6	179.690	11,653.0
177.590	1,311.0	178.650	6,701.0	179.710	11,653.0
177.610	1,395.9	178.670	6,811.4	179.730	11,653.0
177.630	1,480.8	178.690	6,921.8	179.750	11,653.0
177.650	1,565.7	178.710	7,032.2	179.770	11,653.0
177.670	1,650.6	178.730	7,142.6	179.790	11,653.0
177.690	1,739.0	178.750	7,253.0	179.810	11,653.0
177.710	1,831.0	178.770	7,366.9	179.830	11,653.0
177.730	1,923.0	178.790	7,480.8	179.850	11,653.0
177.750	2,015.0	178.810	7,594.8	179.870	11,653.0
177.770	2,113.2	178.830	7,708.7	179.890	11,653.0
177.790	2,211.5	178.850	7,822.6	179.910	11,653.0
177.810	2,309.7	178.870	7,936.5	179.930	11,653.0
177.830	2,408.0	178.890	8,050.4	179.950	11,653.0
177.850	2,506.2	178.910	8,164.4	179.970	11,653.0
177.870	2,604.4	178.930	8,278.3	179.990	11,653.0
177.890	2,702.7	178.950	8,392.2	180.010	11,653.0
177.910	2,800.9	178.970	8,506.1	180.030	11,653.0
177.930	2,899.2	178.990	8,620.0	180.050	11,653.0
177.950	2,997.4	179.010	8,735.6	180.070	11,653.0
177.970	3,095.6	179.030	8,852.9	180.090	11,653.0
177.990	3,193.9	179.050	8,970.2	180.110	11,653.0
178.010	3,294.8	179.070	9,087.5	180.130	11,653.0
178.030	3,398.3	179.090	9,204.8	180.150	11,653.0
178.050	3,501.8	179.110	9,322.0	180.170	11,653.0
178.070	3,605.3	179.130	9,439.3	180.190	11,653.0
178.090	3,708.8	179.150	9,556.6	180.210	11,653.0
178.110	3,812.4	179.170	9,673.9	180.230	11,653.0
178.130	3,915.9	179.190	9,791.2	180.250	11,653.0
178.150	4,019.4	179.210	9,908.4	180.270	11,653.0
178.170	4,122.9	179.230	10,025.7	180.290	11,653.0
178.190	4,226.4	179.250	10,143.0	180.310	11,653.0
178.210	4,330.0	179.270	10,263.8	180.330	11,653.0
178.230	4,433.5	179.290	10,384.6	180.350	11,653.0
178.250	4,537.0	179.310	10,505.4		
178.270	4,643.9	179.330	10,626.2		
178.290	4,750.8	179.350	10,747.0		

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: EIR Boundary Runoff Area=10.2300 ha 84.85% Impervious Runoff Depth=53 mm
Tc=10.0 min CN=94 Runoff=3.128 m³/s 5.464 Ml

Pond 3P: SWM Pond Peak Elev=178.130 m Storage=3,918.3 m³ Inflow=3.128 m³/s 5.464 Ml
Primary=0.025 m³/s 3.598 Ml Secondary=0.055 m³/s 1.544 Ml Outflow=0.080 m³/s 5.142 Ml

Total Runoff Area = 10.2300 ha Runoff Volume = 5.464 Ml Average Runoff Depth = 53 mm
15.15% Pervious = 1.5500 ha 84.85% Impervious = 8.6800 ha

Summary for Subcatchment 4S: EIR Boundary

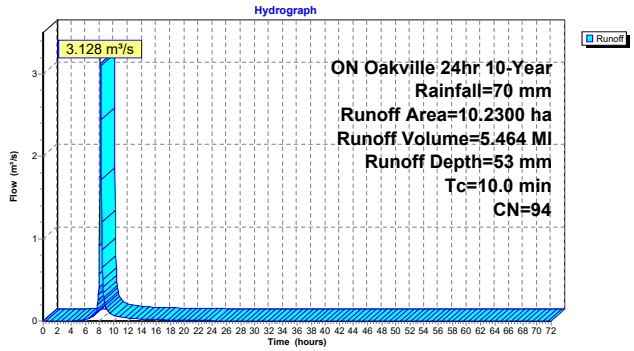
Runoff = 3.128 m³/s @ 8.14 hrs, Volume= 5.464 Ml, Depth= 53 mm
Routed to Pond 3P : SWM Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
ON Oakville 24hr 10-Year Rainfall=70 mm

	Area (ha)	CN	Description
*	8.6800	98	
*	1.5500	74	
	10.2300	94	Weighted Average
	1.5500		15.15% Pervious Area
	8.6800		84.85% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 4S: EIR Boundary



Hydrograph for Subcatchment 4S: EIR Boundary

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	53.00	70	53	0.000
1.00	1	0	0.000	54.00	70	53	0.000
2.00	1	0	0.000	55.00	70	53	0.000
3.00	2	0	0.000	56.00	70	53	0.000
4.00	3	0	0.000	57.00	70	53	0.000
5.00	5	0	0.006	58.00	70	53	0.000
6.00	7	1	0.018	59.00	70	53	0.000
7.00	10	2	0.051	60.00	70	53	0.000
8.00	33	19	**0.916**	61.00	70	53	0.000
9.00	56	41	**0.142**	62.00	70	53	0.000
10.00	59	43	0.066	63.00	70	53	0.000
11.00	61	45	0.044	64.00	70	53	0.000
12.00	62	47	0.034	65.00	70	53	0.000
13.00	64	48	0.027	66.00	70	53	0.000
14.00	64	48	0.023	67.00	70	53	0.000
15.00	65	49	0.020	68.00	70	53	0.000
16.00	66	50	0.018	69.00	70	53	0.000
17.00	67	50	0.016	70.00	70	53	0.000
18.00	67	51	0.015	71.00	70	53	0.000
19.00	68	51	0.014	72.00	70	53	0.000
20.00	68	52	0.013				
21.00	69	52	0.012				
22.00	69	53	0.011				
23.00	69	53	0.010				
24.00	**70**	**53**	0.010				
25.00	70	53	0.000				
26.00	70	53	0.000				
27.00	70	53	0.000				
28.00	70	53	0.000				
29.00	70	53	0.000				
30.00	70	53	0.000				
31.00	70	53	0.000				
32.00	70	53	0.000				
33.00	70	53	0.000				
34.00	70	53	0.000				
35.00	70	53	0.000				
36.00	70	53	0.000				
37.00	70	53	0.000				
38.00	70	53	0.000				
39.00	70	53	0.000				
40.00	70	53	0.000				
41.00	70	53	0.000				
42.00	70	53	0.000				
43.00	70	53	0.000				
44.00	70	53	0.000				
45.00	70	53	0.000				
46.00	70	53	0.000				
47.00	70	53	0.000				
48.00	70	53	0.000				
49.00	70	53	0.000				
50.00	70	53	0.000				
51.00	70	53	0.000				
52.00	70	53	0.000				

Summary for Pond 3P: SWM Pond

Inflow Area = 10.2300 ha, 84.85% Impervious, Inflow Depth = 53 mm for 10-Year event
Inflow = 3.128 m³/s @ 8.14 hrs, Volume= 5.464 Ml
Outflow = 0.080 m³/s @ 9.66 hrs, Volume= 5.142 Ml, Atten= 97%, Lag= 91.6 min
Primary = 0.025 m³/s @ 9.66 hrs, Volume= 3.598 Ml
Secondary = 0.055 m³/s @ 9.66 hrs, Volume= 1.544 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 178.130 m @ 9.66 hrs Storage= 3,918.3 m³

Plug-Flow detention time= 1,095.6 min calculated for 5.142 Ml (94% of inflow)
Center-of-Mass det. time= 1,055.4 min (1,625.6 - 570.3)

Volume	Invert	Avail.Storage	Storage Description
#1	177.250 m	11,653.0 m³	**Custom Stage Data** Listed below

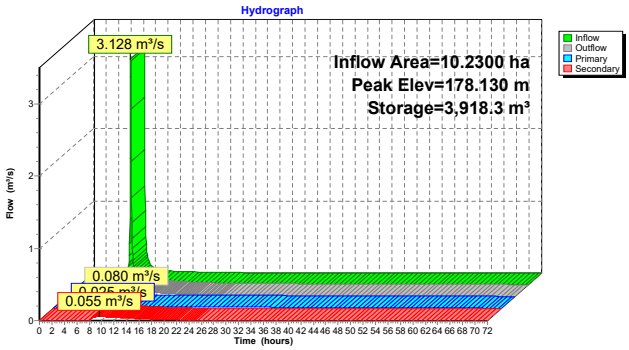
Elevation (meters)	Cum.Store (cubic-meters)
177.250	0.0
177.500	929.0
177.680	1,693.0
177.750	2,015.0
178.000	3,243.0
178.250	4,537.0
178.500	5,873.0
178.750	7,253.0
179.000	8,677.0
179.250	10,143.0
179.500	11,653.0

Device	Routing	Invert	Outlet Devices
#1	Primary	177.250 m	**115 mm Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Secondary	177.850 m	**Special & User-Defined** Head (meters) 0.000 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900 1.000 1.500 2.000 2.500 Disch. (m³/s) 0.00000 0.01700 0.03800 0.05900 0.08000 0.10200 0.12300 0.14300 0.16400 0.18500 0.20600 0.31200 0.41900 0.52500

Primary OutFlow Max=0.025 m³/s @ 9.66 hrs HW=178.130 m (Free Discharge)
↑**1=Orifice/Grate** (Orifice Controls 0.025 m³/s @ 2.41 m/s)

Secondary OutFlow Max=0.055 m³/s @ 9.66 hrs HW=178.130 m (Free Discharge)
↑**2=Special & User-Defined** (Custom Controls 0.055 m³/s)

Pond 3P: SWM Pond



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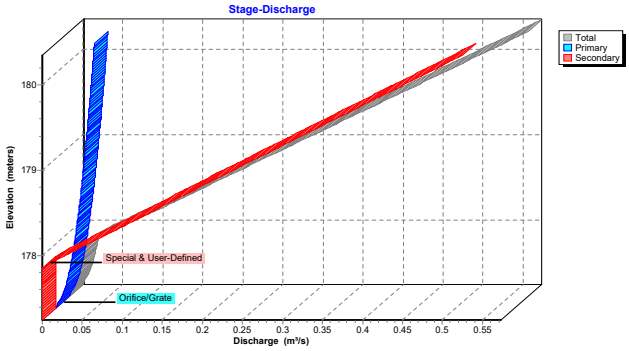

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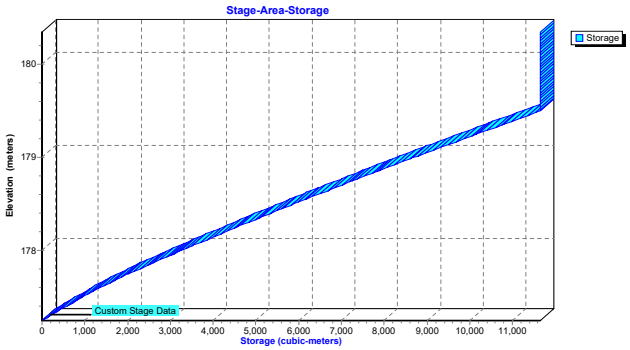


Hydrograph for Pond 3P: SWM Pond

Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Outflow (m³/s)	Primary (m³/s)	Secondary (m³/s)
0.00	0.000	0.0	177.250	0.000	0.000	0.000
2.50	0.000	0.0	177.250	0.000	0.000	0.000
5.00	0.006	10.4	177.253	0.000	0.000	0.000
7.50	**0.112**	**289.1**	**177.328**	**0.004**	**0.004**	**0.000**
10.00	**0.066**	**3,909.4**	**178.129**	**0.080**	**0.025**	**0.055**
12.50	0.030	3,629.8	178.075	0.067	0.024	0.043
15.00	0.020	3,307.9	178.013	0.053	0.023	0.030
17.50	0.015	3,042.3	177.959	0.041	0.022	0.019
20.00	0.013	2,836.0	177.917	0.033	0.022	0.011
22.50	0.011	2,672.4	177.884	0.027	0.021	0.006
25.00	0.000	2,517.2	177.852	0.021	0.020	0.000
27.50	0.000	2,336.8	177.816	0.020	0.020	0.000
30.00	0.000	2,162.9	177.780	0.019	0.019	0.000
32.50	0.000	1,995.3	177.746	0.018	0.018	0.000
35.00	0.000	1,834.2	177.711	0.018	0.018	0.000
37.50	0.000	1,679.8	177.677	0.017	0.017	0.000
40.00	0.000	1,532.5	177.642	0.016	0.016	0.000
42.50	0.000	1,392.4	177.609	0.015	0.015	0.000
45.00	0.000	1,259.6	177.578	0.014	0.014	0.000
47.50	0.000	1,134.0	177.548	0.014	0.014	0.000
50.00	0.000	1,015.7	177.520	0.013	0.013	0.000
52.50	0.000	904.7	177.493	0.012	0.012	0.000
55.00	0.000	801.8	177.466	0.011	0.011	0.000
57.50	0.000	707.1	177.440	0.010	0.010	0.000
60.00	0.000	620.7	177.417	0.009	0.009	0.000
62.50	0.000	542.6	177.396	0.008	0.008	0.000
65.00	0.000	472.9	177.377	0.007	0.007	0.000
67.50	0.000	411.3	177.361	0.006	0.006	0.000
70.00	0.000	358.0	177.346	0.005	0.005	0.000

Stage-Discharge for Pond 3P: SWM Pond

Elevation (meters)	Discharge (m³/s)	Primary (m³/s)	Secondary (m³/s)
177.250	0.000	0.000	0.000
177.300	0.002	0.002	0.000
177.350	0.006	0.006	0.000
177.400	0.008	0.008	0.000
177.450	0.010	0.010	0.000
177.500	0.012	0.012	0.000
177.550	0.014	0.014	0.000
177.600	0.015	0.015	0.000
177.650	0.016	0.016	0.000
177.700	0.017	0.017	0.000
177.750	0.018	0.018	0.000
177.800	0.019	0.019	0.000
177.850	0.020	0.020	0.000
177.900	0.030	0.021	0.009
177.950	0.039	0.022	0.017
178.000	0.050	0.023	0.028
178.050	0.062	0.024	0.038
178.100	0.073	0.025	0.049
178.150	0.084	0.025	0.059
178.200	0.096	0.026	0.069
178.250	0.107	0.027	0.080
178.300	0.119	0.028	0.091
178.350	0.130	0.028	0.102
178.400	0.141	0.029	0.113
178.450	0.153	0.030	0.123
178.500	0.163	0.030	0.133
178.550	0.174	0.031	0.143
178.600	0.185	0.031	0.153
178.650	0.196	0.032	0.164
178.700	0.207	0.033	0.174
178.750	0.218	0.033	0.185
178.800	0.229	0.034	0.196
178.850	0.240	0.034	0.206
178.900	0.251	0.035	0.217
178.950	0.263	0.035	0.227
179.000	0.274	0.036	0.238
179.050	0.285	0.036	0.248
179.100	0.296	0.037	0.259
179.150	0.307	0.037	0.270
179.200	0.318	0.038	0.280
179.250	0.329	0.038	0.291
179.300	0.340	0.039	0.301
179.350	0.351	0.039	0.312
179.400	0.363	0.040	0.323
179.450	0.374	0.040	0.333
179.500	0.385	0.041	0.344
179.550	0.396	0.041	0.355
179.600	0.407	0.042	0.365
179.650	0.418	0.042	0.376
179.700	0.430	0.043	0.387
179.750	0.441	0.043	0.398
179.800	0.452	0.044	0.408
179.850	0.463	0.044	0.419
179.900	0.474	0.044	0.430
179.950	0.485	0.045	0.440
180.000	0.496	0.045	0.451
180.050	0.507	0.046	0.461
180.100	0.518	0.046	0.472
180.150	0.529	0.047	0.483
180.200	0.540	0.047	0.493
180.250	0.551	0.047	0.504
180.300	0.562	0.048	0.514
180.350	**0.573**	**0.048**	**0.525**

Stage-Area-Storage for Pond 3P: SWM Pond

Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)
177.250	0.0	178.310	4,857.6	179.370	10,867.8
177.270	74.3	178.330	4,964.5	179.390	10,988.6
177.290	148.6	178.350	5,071.4	179.410	11,109.4
177.310	223.0	178.370	5,178.3	179.430	11,230.2
177.330	297.3	178.390	5,285.2	179.450	11,351.0
177.350	371.6	178.410	5,392.0	179.470	11,471.8
177.370	445.9	178.430	5,498.9	179.490	**11,592.6**
177.390	520.2	178.450	5,605.8	179.510	**11,653.0**
177.410	594.6	178.470	5,712.7	179.530	11,653.0
177.430	668.9	178.490	5,819.6	179.550	11,653.0
177.450	743.2	178.510	5,928.2	179.570	11,653.0
177.470	817.5	178.530	6,038.6	179.590	11,653.0
177.490	891.8	178.550	6,149.0	179.610	11,653.0
177.510	971.4	178.570	6,259.4	179.630	11,653.0
177.530	1,056.3	178.590	6,369.8	179.650	11,653.0
177.550	1,141.2	178.610	6,480.2	179.670	11,653.0
177.570	1,226.1	178.630	6,590.6	179.690	11,653.0
177.590	1,311.0	178.650	6,701.0	179.710	11,653.0
177.610	1,395.9	178.670	6,811.4	179.730	11,653.0
177.630	1,480.8	178.690	6,921.8	179.750	11,653.0
177.650	1,565.7	178.710	7,032.2	179.770	11,653.0
177.670	1,650.6	178.730	7,142.6	179.790	11,653.0
177.690	1,739.0	178.750	7,253.0	179.810	11,653.0
177.710	1,831.0	178.770	7,366.9	179.830	11,653.0
177.730	1,923.0	178.790	7,480.8	179.850	11,653.0
177.750	2,015.0	178.810	7,594.8	179.870	11,653.0
177.770	2,113.2	178.830	7,708.7	179.890	11,653.0
177.790	2,211.5	178.850	7,822.6	179.910	11,653.0
177.810	2,309.7	178.870	7,936.5	179.930	11,653.0
177.830	2,408.0	178.890	8,050.4	179.950	11,653.0
177.850	2,506.2	178.910	8,164.4	179.970	11,653.0
177.870	2,604.4	178.930	8,278.3	179.990	11,653.0
177.890	2,702.7	178.950	8,392.2	180.010	11,653.0
177.910	2,800.9	178.970	8,506.1	180.030	11,653.0
177.930	2,899.2	178.990	8,620.0	180.050	11,653.0
177.950	2,997.4	179.010	8,735.6	180.070	11,653.0
177.970	3,095.6	179.030	8,852.9	180.090	11,653.0
177.990	3,193.9	179.050	8,970.2	180.110	11,653.0
178.010	3,294.8	179.070	9,087.5	180.130	11,653.0
178.030	3,398.3	179.090	9,204.8	180.150	11,653.0
178.050	3,501.8	179.110	9,322.0	180.170	11,653.0
178.070	3,605.3	179.130	9,439.3	180.190	11,653.0
178.090	3,708.8	179.150	9,556.6	180.210	11,653.0
178.110	3,812.4	179.170	9,673.9	180.230	11,653.0
178.130	3,915.9	179.190	9,791.2	180.250	11,653.0
178.150	4,019.4	179.210	9,908.4	180.270	11,653.0
178.170	4,122.9	179.230	10,025.7	180.290	11,653.0
178.190	4,226.4	179.250	10,143.0	180.310	11,653.0
178.210	4,330.0	179.270	10,263.8	180.330	11,653.0
178.230	4,433.5	179.290	10,384.6	180.350	11,653.0
178.250	4,537.0	179.310	10,505.4		
178.270	4,643.9	179.330	10,626.2		
178.290	4,750.8	179.350	10,747.0		

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: EIR Boundary Runoff Area=10.2300 ha 84.85% Impervious Runoff Depth=65 mm
Tc=10.0 min CN=94 Runoff=3.883 m³/s 6.665 Ml

Pond 3P: SWM Pond Peak Elev=178.288 m Storage=4,739.0 m³ Inflow=3.883 m³/s 6.665 Ml
Primary=0.027 m³/s 3.773 Ml Secondary=0.088 m³/s 2.543 Ml Outflow=0.116 m³/s 6.316 Ml

Total Runoff Area = 10.2300 ha Runoff Volume = 6.665 Ml Average Runoff Depth = 65 mm
15.15% Pervious = 1.5500 ha 84.85% Impervious = 8.6800 ha

Summary for Subcatchment 4S: EIR Boundary

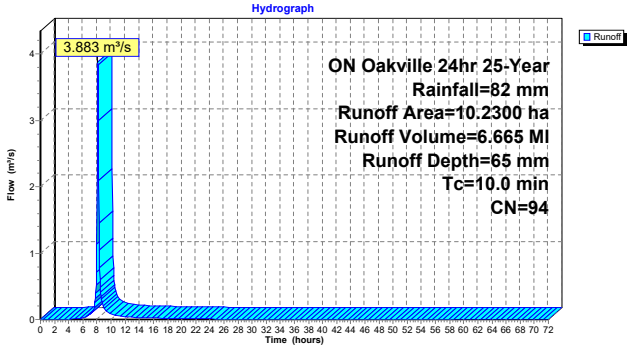
Runoff = 3.883 m³/s @ 8.14 hrs, Volume= 6.665 Ml, Depth= 65 mm
Routed to Pond 3P : SWM Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
ON Oakville 24hr 25-Year Rainfall=82 mm

	Area (ha)	CN	Description
*	8.6800	98	
*	1.5500	74	
	10.2300	94	Weighted Average
	1.5500		15.15% Pervious Area
	8.6800		84.85% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 4S: EIR Boundary



Hydrograph for Subcatchment 4S: EIR Boundary

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	53.00	82	65	0.000
1.00	1	0	0.000	54.00	82	65	0.000
2.00	2	0	0.000	55.00	82	65	0.000
3.00	3	0	0.000	56.00	82	65	0.000
4.00	4	0	0.002	57.00	82	65	0.000
5.00	6	0	0.010	58.00	82	65	0.000
6.00	8	1	0.025	59.00	82	65	0.000
7.00	11	3	0.067	60.00	82	65	0.000
8.00	39	24	**1.137**	61.00	82	65	0.000
9.00	66	50	**0.167**	62.00	82	65	0.000
10.00	70	54	0.077	63.00	82	65	0.000
11.00	72	56	0.052	64.00	82	65	0.000
12.00	74	57	0.039	65.00	82	65	0.000
13.00	75	58	0.032	66.00	82	65	0.000
14.00	76	59	0.027	67.00	82	65	0.000
15.00	77	60	0.024	68.00	82	65	0.000
16.00	78	61	0.021	69.00	82	65	0.000
17.00	78	62	0.019	70.00	82	65	0.000
18.00	79	62	0.017	71.00	82	65	0.000
19.00	79	63	0.016	72.00	82	65	0.000
20.00	80	63	0.015				
21.00	80	64	0.014				
22.00	81	64	0.013				
23.00	81	65	0.012				
24.00	**82**	**65**	0.011				
25.00	82	65	0.000				
26.00	82	65	0.000				
27.00	82	65	0.000				
28.00	82	65	0.000				
29.00	82	65	0.000				
30.00	82	65	0.000				
31.00	82	65	0.000				
32.00	82	65	0.000				
33.00	82	65	0.000				
34.00	82	65	0.000				
35.00	82	65	0.000				
36.00	82	65	0.000				
37.00	82	65	0.000				
38.00	82	65	0.000				
39.00	82	65	0.000				
40.00	82	65	0.000				
41.00	82	65	0.000				
42.00	82	65	0.000				
43.00	82	65	0.000				
44.00	82	65	0.000				
45.00	82	65	0.000				
46.00	82	65	0.000				
47.00	82	65	0.000				
48.00	82	65	0.000				
49.00	82	65	0.000				
50.00	82	65	0.000				
51.00	82	65	0.000				
52.00	82	65	0.000				

Summary for Pond 3P: SWM Pond

Inflow Area = 10.2300 ha, 84.85% Impervious, Inflow Depth = 65 mm for 25-Year event
Inflow = 3.883 m³/s @ 8.14 hrs, Volume= 6.665 Ml
Outflow = 0.116 m³/s @ 9.37 hrs, Volume= 6.316 Ml, Atten= 97%, Lag= 74.1 min
Primary = 0.027 m³/s @ 9.37 hrs, Volume= 3.773 Ml
Secondary = 0.088 m³/s @ 9.37 hrs, Volume= 2.543 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 178.288 m @ 9.37 hrs Storage= 4,739.0 m³

Plug-Flow detention time= 979.8 min calculated for 6.316 Ml (95% of inflow)
Center-of-Mass det. time= 943.3 min (1,508.7 - 565.4)

Volume	Invert	Avail.Storage	Storage Description
#1	177.250 m	11,653.0 m³	**Custom Stage Data** Listed below

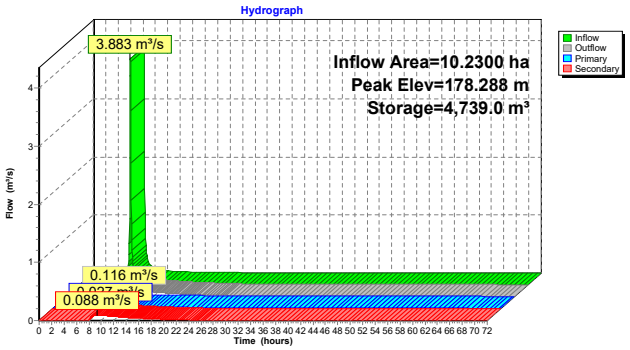
Elevation (meters)	Cum.Store (cubic-meters)
177.250	0.0
177.500	929.0
177.680	1,693.0
177.750	2,015.0
178.000	3,243.0
178.250	4,537.0
178.500	5,873.0
178.750	7,253.0
179.000	8,677.0
179.250	10,143.0
179.500	11,653.0

Device	Routing	Invert	Outlet Devices
#1	Primary	177.250 m	**115 mm Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Secondary	177.850 m	**Special & User-Defined** Head (meters) 0.000 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900 1.000 1.500 2.000 2.500 Disch. (m³/s) 0.00000 0.01700 0.03800 0.05900 0.08000 0.10200 0.12300 0.14300 0.16400 0.18500 0.20600 0.31200 0.41900 0.52500

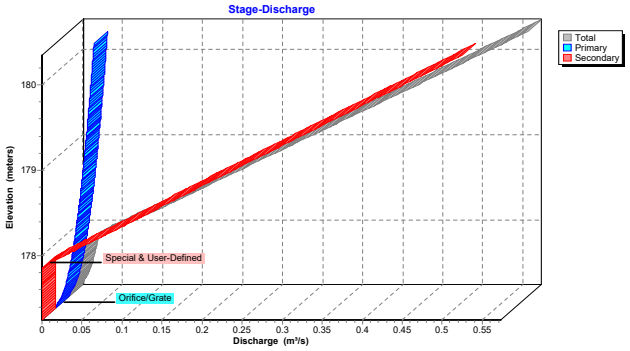
Primary OutFlow Max=0.027 m³/s @ 9.37 hrs HW=178.288 m (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.027 m³/s @ 2.63 m/s)

Secondary OutFlow Max=0.088 m³/s @ 9.37 hrs HW=178.288 m (Free Discharge)
└**2=Special & User-Defined** (Custom Controls 0.088 m³/s)

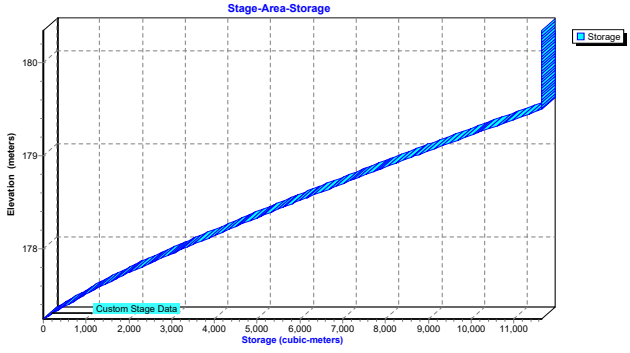
Pond 3P: SWM Pond



Pond 3P: SWM Pond



Pond 3P: SWM Pond



Hydrograph for Pond 3P: SWM Pond

Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Outflow (m³/s)	Primary (m³/s)	Secondary (m³/s)
0.00	0.000	0.0	177.250	0.000	0.000	0.000
2.50	0.000	0.0	177.250	0.000	0.000	0.000
5.00	0.010	23.2	177.256	0.000	0.000	0.000
7.50	**0.143**	**394.5**	**177.356**	**0.006**	**0.006**	**0.000**
10.00	**0.077**	**4,691.1**	**178.279**	**0.114**	**0.027**	**0.086**
12.50	0.035	4,211.4	178.187	0.093	0.026	0.067
15.00	0.024	3,730.6	178.094	0.072	0.024	0.047
17.50	0.018	3,347.2	178.020	0.055	0.023	0.032
20.00	0.015	3,058.2	177.962	0.042	0.022	0.020
22.50	0.012	2,843.7	177.919	0.033	0.022	0.012
25.00	0.000	2,646.2	177.879	0.026	0.021	0.005
27.50	0.000	2,447.8	177.838	0.020	0.020	0.000
30.00	0.000	2,270.0	177.802	0.019	0.019	0.000
32.50	0.000	2,098.4	177.767	0.019	0.019	0.000
35.00	0.000	1,933.2	177.732	0.018	0.018	0.000
37.50	0.000	1,774.7	177.698	0.017	0.017	0.000
40.00	0.000	1,622.9	177.663	0.016	0.016	0.000
42.50	0.000	1,478.3	177.629	0.016	0.016	0.000
45.00	0.000	1,341.0	177.597	0.015	0.015	0.000
47.50	0.000	1,211.0	177.566	0.014	0.014	0.000
50.00	0.000	1,088.2	177.538	0.013	0.013	0.000
52.50	0.000	972.7	177.510	0.012	0.012	0.000
55.00	0.000	864.6	177.483	0.012	0.012	0.000
57.50	0.000	764.8	177.456	0.011	0.011	0.000
60.00	0.000	673.3	177.431	0.010	0.010	0.000
62.50	0.000	590.0	177.409	0.009	0.009	0.000
65.00	0.000	515.1	177.389	0.008	0.008	0.000
67.50	0.000	448.5	177.371	0.007	0.007	0.000
70.00	0.000	390.0	177.355	0.006	0.006	0.000

Stage-Discharge for Pond 3P: SWM Pond

Elevation (meters)	Discharge (m³/s)	Primary (m³/s)	Secondary (m³/s)	Elevation (meters)	Discharge (m³/s)	Primary (m³/s)	Secondary (m³/s)
177.250	0.000	0.000	0.000	179.900	0.474	0.044	0.430
177.300	0.002	0.002	0.000	179.950	0.485	0.045	0.440
177.350	0.006	0.006	0.000	180.000	0.496	0.045	0.451
177.400	0.008	0.008	0.000	180.050	0.507	0.046	0.461
177.450	0.010	0.010	0.000	180.100	0.518	0.046	0.472
177.500	0.012	0.012	0.000	180.150	0.529	0.047	0.483
177.550	0.014	0.014	0.000	180.200	0.540	0.047	0.493
177.600	0.015	0.015	0.000	180.250	0.551	0.047	0.504
177.650	0.016	0.016	0.000	180.300	0.562	0.048	0.514
177.700	0.017	0.017	0.000	180.350	**0.573**	**0.048**	**0.525**
177.750	0.018	0.018	0.000				
177.800	0.019	0.019	0.000				
177.850	0.020	0.020	0.000				
177.900	0.030	0.021	0.009				
177.950	0.039	0.022	0.017				
178.000	0.050	0.023	0.028				
178.050	0.062	0.024	0.038				
178.100	0.073	0.025	0.049				
178.150	0.084	0.025	0.059				
178.200	0.096	0.026	0.069				
178.250	0.107	0.027	0.080				
178.300	0.119	0.028	0.091				
178.350	0.130	0.028	0.102				
178.400	0.141	0.029	0.113				
178.450	0.153	0.030	0.123				
178.500	0.163	0.030	0.133				
178.550	0.174	0.031	0.143				
178.600	0.185	0.031	0.153				
178.650	0.196	0.032	0.164				
178.700	0.207	0.033	0.174				
178.750	0.218	0.033	0.185				
178.800	0.229	0.034	0.196				
178.850	0.240	0.034	0.206				
178.900	0.251	0.035	0.217				
178.950	0.263	0.035	0.227				
179.000	0.274	0.036	0.238				
179.050	0.285	0.036	0.248				
179.100	0.296	0.037	0.259				
179.150	0.307	0.037	0.270				
179.200	0.318	0.038	0.280				
179.250	0.329	0.038	0.291				
179.300	0.340	0.039	0.301				
179.350	0.351	0.039	0.312				
179.400	0.363	0.040	0.323				
179.450	0.374	0.040	0.333				
179.500	0.385	0.041	0.344				
179.550	0.396	0.041	0.355				
179.600	0.407	0.042	0.365				
179.650	0.418	0.042	0.376				
179.700	0.430	0.043	0.387				
179.750	0.441	0.043	0.398				
179.800	0.452	0.044	0.408				
179.850	0.463	0.044	0.419				

Stage-Area-Storage for Pond 3P: SWM Pond

Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)
177.250	0.0	178.310	4,857.6	179.370	10,867.8
177.270	74.3	178.330	4,964.5	179.390	10,988.6
177.290	148.6	178.350	5,071.4	179.410	11,109.4
177.310	223.0	178.370	5,178.3	179.430	11,230.2
177.330	297.3	178.390	5,285.2	179.450	11,351.0
177.350	371.6	178.410	5,392.0	179.470	11,471.8
177.370	445.9	178.430	5,498.9	179.490	**11,592.6**
177.390	520.2	178.450	5,605.8	179.510	**11,653.0**
177.410	594.6	178.470	5,712.7	179.530	11,653.0
177.430	668.9	178.490	5,819.6	179.550	11,653.0
177.450	743.2	178.510	5,928.2	179.570	11,653.0
177.470	817.5	178.530	6,038.6	179.590	11,653.0
177.490	891.8	178.550	6,149.0	179.610	11,653.0
177.510	971.4	178.570	6,259.4	179.630	11,653.0
177.530	1,056.3	178.590	6,369.8	179.650	11,653.0
177.550	1,141.2	178.610	6,480.2	179.670	11,653.0
177.570	1,226.1	178.630	6,590.6	179.690	11,653.0
177.590	1,311.0	178.650	6,701.0	179.710	11,653.0
177.610	1,395.9	178.670	6,811.4	179.730	11,653.0
177.630	1,480.8	178.690	6,921.8	179.750	11,653.0
177.650	1,565.7	178.710	7,032.2	179.770	11,653.0
177.670	1,650.6	178.730	7,142.6	179.790	11,653.0
177.690	1,739.0	178.750	7,253.0	179.810	11,653.0
177.710	1,831.0	178.770	7,366.9	179.830	11,653.0
177.730	1,923.0	178.790	7,480.8	179.850	11,653.0
177.750	2,015.0	178.810	7,594.8	179.870	11,653.0
177.770	2,113.2	178.830	7,708.7	179.890	11,653.0
177.790	2,211.5	178.850	7,822.6	179.910	11,653.0
177.810	2,309.7	178.870	7,936.5	179.930	11,653.0
177.830	2,408.0	178.890	8,050.4	179.950	11,653.0
177.850	2,506.2	178.910	8,164.4	179.970	11,653.0
177.870	2,604.4	178.930	8,278.3	179.990	11,653.0
177.890	2,702.7	178.950	8,392.2	180.010	11,653.0
177.910	2,800.9	178.970	8,506.1	180.030	11,653.0
177.930	2,899.2	178.990	8,620.0	180.050	11,653.0
177.950	2,997.4	179.010	8,735.6	180.070	11,653.0
177.970	3,095.6	179.030	8,852.9	180.090	11,653.0
177.990	3,193.9	179.050	8,970.2	180.110	11,653.0
178.010	3,294.8	179.070	9,087.5	180.130	11,653.0
178.030	3,398.3	179.090	9,204.8	180.150	11,653.0
178.050	3,501.8	179.110	9,322.0	180.170	11,653.0
178.070	3,605.3	179.130	9,439.3	180.190	11,653.0
178.090	3,708.8	179.150	9,556.6	180.210	11,653.0
178.110	3,812.4	179.170	9,673.9	180.230	11,653.0
178.130	3,915.9	179.190	9,791.2	180.250	11,653.0
178.150	4,019.4	179.210	9,908.4	180.270	11,653.0
178.170	4,122.9	179.230	10,025.7	180.290	11,653.0
178.190	4,226.4	179.250	10,143.0	180.310	11,653.0
178.210	4,330.0	179.270	10,263.8	180.330	11,653.0
178.230	4,433.5	179.290	10,384.6	180.350	11,653.0
178.250	4,537.0	179.310	10,505.4		
178.270	4,643.9	179.330	10,626.2		
178.290	4,750.8	179.350	10,747.0		

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: EIR Boundary Runoff Area=10.2300 ha 84.85% Impervious Runoff Depth=72 mm
Tc=10.0 min CN=94 Runoff=4.416 m³/s 7.358 Ml

Pond 3P: SWM Pond Peak Elev=178.389 m Storage=5,279.7 m³ Inflow=4.416 m³/s 7.358 Ml
Primary=0.029 m³/s 3.852 Ml Secondary=0.110 m³/s 3.145 Ml Outflow=0.139 m³/s 6.998 Ml

Total Runoff Area = 10.2300 ha Runoff Volume = 7.358 Ml Average Runoff Depth = 72 mm
15.15% Pervious = 1.5500 ha 84.85% Impervious = 8.6800 ha

Summary for Subcatchment 4S: EIR Boundary

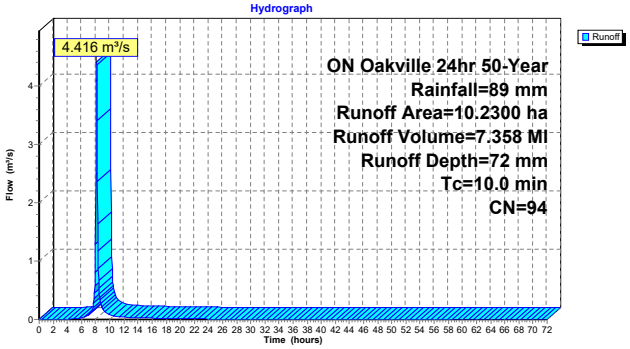
Runoff = 4.416 m³/s @ 8.14 hrs, Volume= 7.358 Ml, Depth= 72 mm
Routed to Pond 3P : SWM Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
ON Oakville 24hr 50-Year Rainfall=89 mm

	Area (ha)	CN	Description
*	8.6800	98	
*	1.5500	74	
	10.2300	94	Weighted Average
	1.5500		15.15% Pervious Area
	8.6800		84.85% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 4S: EIR Boundary



Hydrograph for Subcatchment 4S: EIR Boundary

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	53.00	89	72	0.000
1.00	1	0	0.000	54.00	89	72	0.000
2.00	2	0	0.000	55.00	89	72	0.000
3.00	3	0	0.000	56.00	89	72	0.000
4.00	4	0	0.003	57.00	89	72	0.000
5.00	6	0	0.011	58.00	89	72	0.000
6.00	8	1	0.027	59.00	89	72	0.000
7.00	12	3	0.073	60.00	89	72	0.000
8.00	42	28	**1.297**	61.00	89	72	0.000
9.00	73	56	**0.180**	62.00	89	72	0.000
10.00	76	60	0.081	63.00	89	72	0.000
11.00	79	62	0.054	64.00	89	72	0.000
12.00	80	64	0.041	65.00	89	72	0.000
13.00	82	65	0.033	66.00	89	72	0.000
14.00	83	66	0.028	67.00	89	72	0.000
15.00	84	67	0.024	68.00	89	72	0.000
16.00	84	68	0.021	69.00	89	72	0.000
17.00	85	68	0.019	70.00	89	72	0.000
18.00	86	69	0.017	71.00	89	72	0.000
19.00	86	70	0.016	72.00	89	72	0.000
20.00	87	70	0.015				
21.00	87	71	0.014				
22.00	88	71	0.013				
23.00	88	72	0.012				
24.00	**89**	**72**	0.012				
25.00	89	72	0.000				
26.00	89	72	0.000				
27.00	89	72	0.000				
28.00	89	72	0.000				
29.00	89	72	0.000				
30.00	89	72	0.000				
31.00	89	72	0.000				
32.00	89	72	0.000				
33.00	89	72	0.000				
34.00	89	72	0.000				
35.00	89	72	0.000				
36.00	89	72	0.000				
37.00	89	72	0.000				
38.00	89	72	0.000				
39.00	89	72	0.000				
40.00	89	72	0.000				
41.00	89	72	0.000				
42.00	89	72	0.000				
43.00	89	72	0.000				
44.00	89	72	0.000				
45.00	89	72	0.000				
46.00	89	72	0.000				
47.00	89	72	0.000				
48.00	89	72	0.000				
49.00	89	72	0.000				
50.00	89	72	0.000				
51.00	89	72	0.000				
52.00	89	72	0.000				

Summary for Pond 3P: SWM Pond

Inflow Area = 10.2300 ha, 84.85% Impervious, Inflow Depth = 72 mm for 50-Year event
Inflow = 4.416 m³/s @ 8.14 hrs, Volume= 7.358 Ml
Outflow = 0.139 m³/s @ 9.24 hrs, Volume= 6.998 Ml, Atten= 97%, Lag= 66.0 min
Primary = 0.029 m³/s @ 9.24 hrs, Volume= 3.852 Ml
Secondary = 0.110 m³/s @ 9.24 hrs, Volume= 3.145 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 178.389 m @ 9.24 hrs Storage= 5,279.7 m³

Plug-Flow detention time= 925.0 min calculated for 6.993 Ml (95% of inflow)
Center-of-Mass det. time= 892.4 min (1,452.2 - 559.8)

Volume	Invert	Avail.Storage	Storage Description
#1	177.250 m	11,653.0 m³	**Custom Stage Data** Listed below

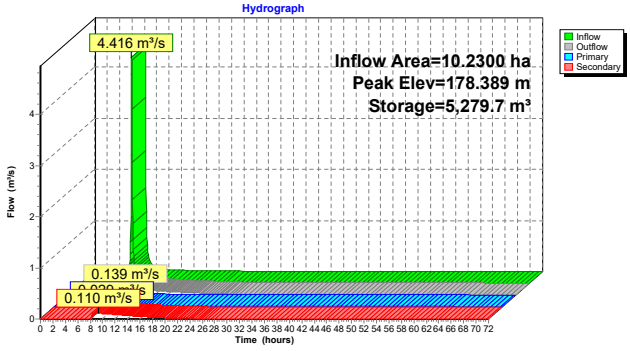
Elevation (meters)	Cum.Store (cubic-meters)
177.250	0.0
177.500	929.0
177.680	1,693.0
177.750	2,015.0
178.000	3,243.0
178.250	4,537.0
178.500	5,873.0
178.750	7,253.0
179.000	8,677.0
179.250	10,143.0
179.500	11,653.0

Device	Routing	Invert	Outlet Devices
#1	Primary	177.250 m	**115 mm Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Secondary	177.850 m	**Special & User-Defined** Head (meters) 0.000 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900 1.000 1.500 2.000 2.500 Disch. (m³/s) 0.00000 0.01700 0.03800 0.05900 0.08000 0.10200 0.12300 0.14300 0.16400 0.18500 0.20600 0.31200 0.41900 0.52500

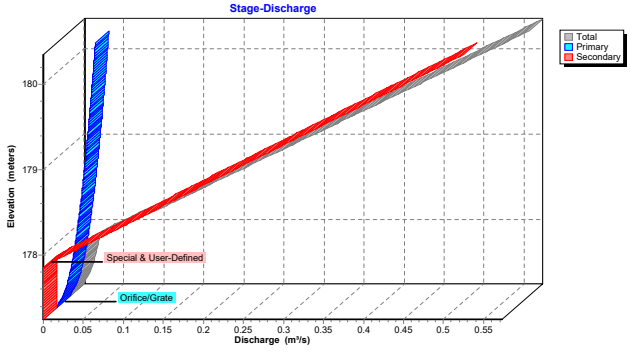
Primary OutFlow Max=0.029 m³/s @ 9.24 hrs HW=178.389 m (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.029 m³/s @ 2.76 m/s)

Secondary OutFlow Max=0.110 m³/s @ 9.24 hrs HW=178.389 m (Free Discharge)
└**2=Special & User-Defined** (Custom Controls 0.110 m³/s)

Pond 3P: SWM Pond



Pond 3P: SWM Pond



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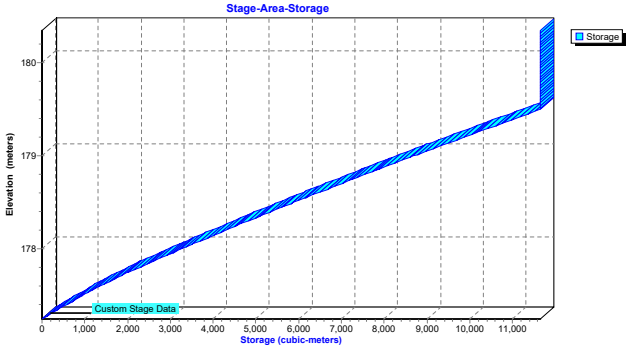


Hydrograph for Pond 3P: SWM Pond

Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Outflow (m³/s)	Primary (m³/s)	Secondary (m³/s)
0.00	0.000	0.0	177.250	0.000	0.000	0.000
2.50	0.000	0.0	177.250	0.000	0.000	0.000
5.00	0.011	26.3	177.257	0.000	0.000	0.000
7.50	**0.158**	**429.8**	**177.366**	**0.007**	**0.007**	**0.000**
10.00	**0.081**	**5,189.3**	**178.372**	**0.135**	**0.028**	**0.107**
12.50	0.036	4,563.2	178.255	0.108	0.027	0.081
15.00	0.024	3,974.8	178.141	0.082	0.025	0.057
17.50	0.018	3,515.8	178.053	0.062	0.024	0.039
20.00	0.015	3,173.3	177.986	0.047	0.023	0.025
22.50	0.013	2,924.4	177.935	0.036	0.022	0.014
25.00	0.000	2,704.3	177.890	0.028	0.021	0.007
27.50	0.000	2,491.5	177.847	0.020	0.020	0.000
30.00	0.000	2,312.2	177.811	0.020	0.020	0.000
32.50	0.000	2,139.2	177.775	0.019	0.019	0.000
35.00	0.000	1,972.4	177.741	0.018	0.018	0.000
37.50	0.000	1,812.2	177.706	0.017	0.017	0.000
40.00	0.000	1,658.8	177.672	0.017	0.017	0.000
42.50	0.000	1,512.5	177.637	0.016	0.016	0.000
45.00	0.000	1,373.4	177.605	0.015	0.015	0.000
47.50	0.000	1,241.6	177.574	0.014	0.014	0.000
50.00	0.000	1,117.1	177.544	0.013	0.013	0.000
52.50	0.000	999.8	177.517	0.013	0.013	0.000
55.00	0.000	889.9	177.489	0.012	0.012	0.000
57.50	0.000	788.1	177.462	0.011	0.011	0.000
60.00	0.000	694.5	177.437	0.010	0.010	0.000
62.50	0.000	609.3	177.414	0.009	0.009	0.000
65.00	0.000	532.4	177.393	0.008	0.008	0.000
67.50	0.000	463.8	177.375	0.007	0.007	0.000
70.00	0.000	403.3	177.359	0.006	0.006	0.000

Stage-Discharge for Pond 3P: SWM Pond

Elevation (meters)	Discharge (m³/s)	Primary (m³/s)	Secondary (m³/s)
177.250	0.000	0.000	0.000
177.300	0.002	0.002	0.000
177.350	0.006	0.006	0.000
177.400	0.008	0.008	0.000
177.450	0.010	0.010	0.000
177.500	0.012	0.012	0.000
177.550	0.014	0.014	0.000
177.600	0.015	0.015	0.000
177.650	0.016	0.016	0.000
177.700	0.017	0.017	0.000
177.750	0.018	0.018	0.000
177.800	0.019	0.019	0.000
177.850	0.020	0.020	0.000
177.900	0.030	0.021	0.009
177.950	0.039	0.022	0.017
178.000	0.050	0.023	0.028
178.050	0.062	0.024	0.038
178.100	0.073	0.025	0.049
178.150	0.084	0.025	0.059
178.200	0.096	0.026	0.069
178.250	0.107	0.027	0.080
178.300	0.119	0.028	0.091
178.350	0.130	0.028	0.102
178.400	0.141	0.029	0.113
178.450	0.153	0.030	0.123
178.500	0.163	0.030	0.133
178.550	0.174	0.031	0.143
178.600	0.185	0.031	0.153
178.650	0.196	0.032	0.164
178.700	0.207	0.033	0.174
178.750	0.218	0.033	0.185
178.800	0.229	0.034	0.196
178.850	0.240	0.034	0.206
178.900	0.251	0.035	0.217
178.950	0.263	0.035	0.227
179.000	0.274	0.036	0.238
179.050	0.285	0.036	0.248
179.100	0.296	0.037	0.259
179.150	0.307	0.037	0.270
179.200	0.318	0.038	0.280
179.250	0.329	0.038	0.291
179.300	0.340	0.039	0.301
179.350	0.351	0.039	0.312
179.400	0.363	0.040	0.323
179.450	0.374	0.040	0.333
179.500	0.385	0.041	0.344
179.550	0.396	0.041	0.355
179.600	0.407	0.042	0.365
179.650	0.418	0.042	0.376
179.700	0.430	0.043	0.387
179.750	0.441	0.043	0.398
179.800	0.452	0.044	0.408
179.850	0.463	0.044	0.419
179.900	0.474	0.044	0.430
179.950	0.485	0.045	0.440
180.000	0.496	0.045	0.451
180.050	0.507	0.046	0.461
180.100	0.518	0.046	0.472
180.150	0.529	0.047	0.483
180.200	0.540	0.047	0.493
180.250	0.551	0.047	0.504
180.300	0.562	0.048	0.514
180.350	**0.573**	**0.048**	**0.525**

Stage-Area-Storage for Pond 3P: SWM Pond

Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)
177.250	0.0	178.310	4,857.6	179.370	10,867.8
177.270	74.3	178.330	4,964.5	179.390	10,988.6
177.290	148.6	178.350	5,071.4	179.410	11,109.4
177.310	223.0	178.370	5,178.3	179.430	11,230.2
177.330	297.3	178.390	5,285.2	179.450	11,351.0
177.350	371.6	178.410	5,392.0	179.470	11,471.8
177.370	445.9	178.430	5,498.9	179.490	**11,592.6**
177.390	520.2	178.450	5,605.8	179.510	**11,653.0**
177.410	594.6	178.470	5,712.7	179.530	11,653.0
177.430	668.9	178.490	5,819.6	179.550	11,653.0
177.450	743.2	178.510	5,928.2	179.570	11,653.0
177.470	817.5	178.530	6,038.6	179.590	11,653.0
177.490	891.8	178.550	6,149.0	179.610	11,653.0
177.510	971.4	178.570	6,259.4	179.630	11,653.0
177.530	1,056.3	178.590	6,369.8	179.650	11,653.0
177.550	1,141.2	178.610	6,480.2	179.670	11,653.0
177.570	1,226.1	178.630	6,590.6	179.690	11,653.0
177.590	1,311.0	178.650	6,701.0	179.710	11,653.0
177.610	1,395.9	178.670	6,811.4	179.730	11,653.0
177.630	1,480.8	178.690	6,921.8	179.750	11,653.0
177.650	1,565.7	178.710	7,032.2	179.770	11,653.0
177.670	1,650.6	178.730	7,142.6	179.790	11,653.0
177.690	1,739.0	178.750	7,253.0	179.810	11,653.0
177.710	1,831.0	178.770	7,366.9	179.830	11,653.0
177.730	1,923.0	178.790	7,480.8	179.850	11,653.0
177.750	2,015.0	178.810	7,594.8	179.870	11,653.0
177.770	2,113.2	178.830	7,708.7	179.890	11,653.0
177.790	2,211.5	178.850	7,822.6	179.910	11,653.0
177.810	2,309.7	178.870	7,936.5	179.930	11,653.0
177.830	2,408.0	178.890	8,050.4	179.950	11,653.0
177.850	2,506.2	178.910	8,164.4	179.970	11,653.0
177.870	2,604.4	178.930	8,278.3	179.990	11,653.0
177.890	2,702.7	178.950	8,392.2	180.010	11,653.0
177.910	2,800.9	178.970	8,506.1	180.030	11,653.0
177.930	2,899.2	178.990	8,620.0	180.050	11,653.0
177.950	2,997.4	179.010	8,735.6	180.070	11,653.0
177.970	3,095.6	179.030	8,852.9	180.090	11,653.0
177.990	3,193.9	179.050	8,970.2	180.110	11,653.0
178.010	3,294.8	179.070	9,087.5	180.130	11,653.0
178.030	3,398.3	179.090	9,204.8	180.150	11,653.0
178.050	3,501.8	179.110	9,322.0	180.170	11,653.0
178.070	3,605.3	179.130	9,439.3	180.190	11,653.0
178.090	3,708.8	179.150	9,556.6	180.210	11,653.0
178.110	3,812.4	179.170	9,673.9	180.230	11,653.0
178.130	3,915.9	179.190	9,791.2	180.250	11,653.0
178.150	4,019.4	179.210	9,908.4	180.270	11,653.0
178.170	4,122.9	179.230	10,025.7	180.290	11,653.0
178.190	4,226.4	179.250	10,143.0	180.310	11,653.0
178.210	4,330.0	179.270	10,263.8	180.330	11,653.0
178.230	4,433.5	179.290	10,384.6	180.350	11,653.0
178.250	4,537.0	179.310	10,505.4		
178.270	4,643.9	179.330	10,626.2		
178.290	4,750.8	179.350	10,747.0		

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: EIR Boundary Runoff Area=10.2300 ha 84.85% Impervious Runoff Depth=80 mm
Tc=10.0 min CN=94 Runoff=4.937 m³/s 8.219 Ml

Pond 3P: SWM Pond Peak Elev=178.501 m Storage=5,880.3 m³ Inflow=4.937 m³/s 8.219 Ml
Primary=0.030 m³/s 3.957 Ml Secondary=0.133 m³/s 3.884 Ml Outflow=0.163 m³/s 7.841 Ml

Total Runoff Area = 10.2300 ha Runoff Volume = 8.219 Ml Average Runoff Depth = 80 mm
15.15% Pervious = 1.5500 ha 84.85% Impervious = 8.6800 ha

Summary for Subcatchment 4S: EIR Boundary

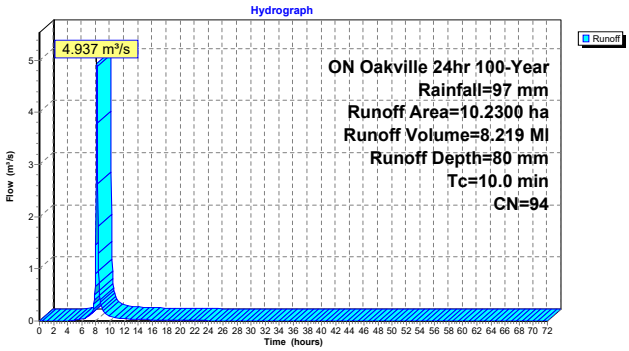
Runoff = 4.937 m³/s @ 8.14 hrs, Volume= 8.219 Ml, Depth= 80 mm
Routed to Pond 3P : SWM Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
ON Oakville 24hr 100-Year Rainfall=97 mm

	Area (ha)	CN	Description
*	8.6800	98	
*	1.5500	74	
	10.2300	94	Weighted Average
	1.5500		15.15% Pervious Area
	8.6800		84.85% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 4S: EIR Boundary



Hydrograph for Subcatchment 4S: EIR Boundary

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	53.00	97	80	0.000
1.00	1	0	0.000	54.00	97	80	0.000
2.00	2	0	0.000	55.00	97	80	0.000
3.00	3	0	0.000	56.00	97	80	0.000
4.00	4	0	0.005	57.00	97	80	0.000
5.00	6	0	0.015	58.00	97	80	0.000
6.00	9	1	0.033	59.00	97	80	0.000
7.00	13	4	0.085	60.00	97	80	0.000
8.00	46	31	**1.455**	61.00	97	80	0.000
9.00	80	63	**0.198**	62.00	97	80	0.000
10.00	84	67	0.089	63.00	97	80	0.000
11.00	86	70	0.059	64.00	97	80	0.000
12.00	88	71	0.045	65.00	97	80	0.000
13.00	90	73	0.036	66.00	97	80	0.000
14.00	91	74	0.031	67.00	97	80	0.000
15.00	92	75	0.027	68.00	97	80	0.000
16.00	93	76	0.024	69.00	97	80	0.000
17.00	93	76	0.021	70.00	97	80	0.000
18.00	94	77	0.019	71.00	97	80	0.000
19.00	95	78	0.018	72.00	97	80	0.000
20.00	95	78	0.016				
21.00	96	79	0.015				
22.00	96	79	0.014				
23.00	97	80	0.013				
24.00	**97**	**80**	0.013				
25.00	97	80	0.000				
26.00	97	80	0.000				
27.00	97	80	0.000				
28.00	97	80	0.000				
29.00	97	80	0.000				
30.00	97	80	0.000				
31.00	97	80	0.000				
32.00	97	80	0.000				
33.00	97	80	0.000				
34.00	97	80	0.000				
35.00	97	80	0.000				
36.00	97	80	0.000				
37.00	97	80	0.000				
38.00	97	80	0.000				
39.00	97	80	0.000				
40.00	97	80	0.000				
41.00	97	80	0.000				
42.00	97	80	0.000				
43.00	97	80	0.000				
44.00	97	80	0.000				
45.00	97	80	0.000				
46.00	97	80	0.000				
47.00	97	80	0.000				
48.00	97	80	0.000				
49.00	97	80	0.000				
50.00	97	80	0.000				
51.00	97	80	0.000				
52.00	97	80	0.000				

Summary for Pond 3P: SWM Pond

Inflow Area = 10.2300 ha, 84.85% Impervious, Inflow Depth = 80 mm for 100-Year event
Inflow = 4.937 m³/s @ 8.14 hrs, Volume= 8.219 Ml
Outflow = 0.163 m³/s @ 9.17 hrs, Volume= 7.841 Ml, Atten= 97%, Lag= 61.9 min
Primary = 0.030 m³/s @ 9.17 hrs, Volume= 3.957 Ml
Secondary = 0.133 m³/s @ 9.17 hrs, Volume= 3.884 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 178.501 m @ 9.17 hrs Storage= 5,880.3 m³

Plug-Flow detention time= 875.4 min calculated for 7.841 Ml (95% of inflow)
Center-of-Mass det. time= 842.9 min (1,400.9 - 558.0)

Volume	Invert	Avail.Storage	Storage Description
#1	177.250 m	11,653.0 m³	**Custom Stage Data** Listed below

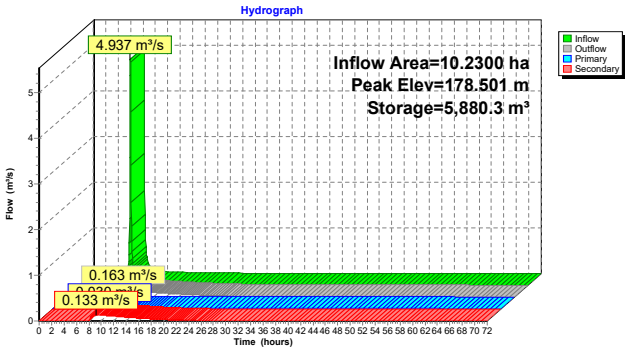
Elevation (meters)	Cum.Store (cubic-meters)
177.250	0.0
177.500	929.0
177.680	1,693.0
177.750	2,015.0
178.000	3,243.0
178.250	4,537.0
178.500	5,873.0
178.750	7,253.0
179.000	8,677.0
179.250	10,143.0
179.500	11,653.0

Device	Routing	Invert	Outlet Devices
#1	Primary	177.250 m	**115 mm Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Secondary	177.850 m	**Special & User-Defined** Head (meters) 0.000 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900 1.000 1.500 2.000 2.500 Disch. (m³/s) 0.00000 0.01700 0.03800 0.05900 0.08000 0.10200 0.12300 0.14300 0.16400 0.18500 0.20600 0.31200 0.41900 0.52500

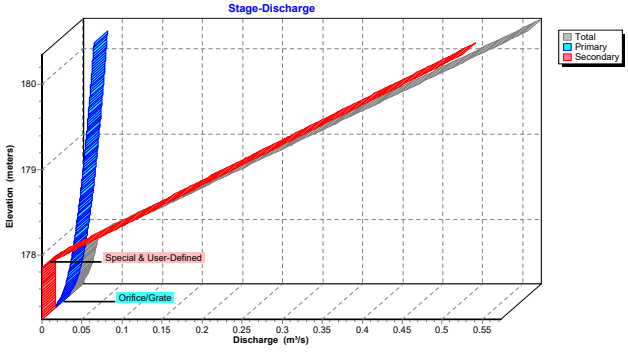
Primary OutFlow Max=0.030 m³/s @ 9.17 hrs HW=178.501 m (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.030 m³/s @ 2.90 m/s)

Secondary OutFlow Max=0.133 m³/s @ 9.17 hrs HW=178.501 m (Free Discharge)
2=Special & User-Defined (Custom Controls 0.133 m³/s)

Pond 3P: SWM Pond



Pond 3P: SWM Pond



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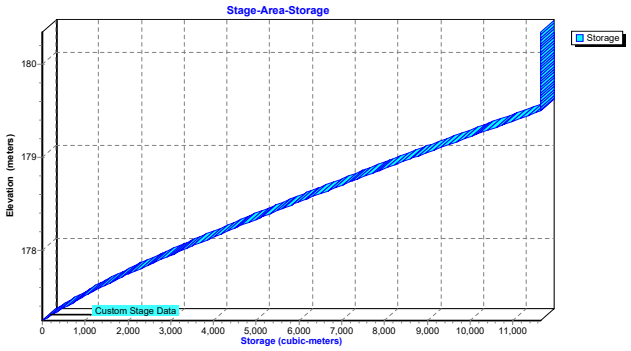


Hydrograph for Pond 3P: SWM Pond

Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Outflow (m³/s)	Primary (m³/s)	Secondary (m³/s)
0.00	0.000	0.0	177.250	0.000	0.000	0.000
2.50	0.000	0.0	177.250	0.000	0.000	0.000
5.00	0.015	39.2	177.261	0.000	0.000	0.000
7.50	**0.181**	**514.2**	**177.388**	**0.008**	**0.008**	**0.000**
10.00	**0.089**	**5,751.6**	**178.477**	**0.158**	**0.030**	**0.128**
12.50	0.040	4,985.1	178.334	0.126	0.028	0.098
15.00	0.027	4,281.8	178.201	0.096	0.026	0.070
17.50	0.020	3,738.9	178.096	0.072	0.025	0.048
20.00	0.016	3,336.0	178.018	0.055	0.023	0.031
22.50	0.014	3,042.8	177.959	0.041	0.022	0.019
25.00	0.000	2,793.8	177.909	0.031	0.021	0.010
27.50	0.000	2,555.1	177.860	0.022	0.021	0.002
30.00	0.000	2,371.7	177.823	0.020	0.020	0.000
32.50	0.000	2,196.6	177.787	0.019	0.019	0.000
35.00	0.000	2,027.7	177.753	0.018	0.018	0.000
37.50	0.000	1,865.3	177.717	0.018	0.018	0.000
40.00	0.000	1,709.6	177.684	0.017	0.017	0.000
42.50	0.000	1,560.8	177.649	0.016	0.016	0.000
45.00	0.000	1,419.3	177.616	0.015	0.015	0.000
47.50	0.000	1,285.1	177.584	0.015	0.015	0.000
50.00	0.000	1,158.1	177.554	0.014	0.014	0.000
52.50	0.000	1,038.4	177.526	0.013	0.013	0.000
55.00	0.000	925.9	177.499	0.012	0.012	0.000
57.50	0.000	821.3	177.471	0.011	0.011	0.000
60.00	0.000	725.0	177.445	0.010	0.010	0.000
62.50	0.000	637.0	177.421	0.009	0.009	0.000
65.00	0.000	557.3	177.400	0.008	0.008	0.000
67.50	0.000	485.9	177.381	0.007	0.007	0.000
70.00	0.000	422.8	177.364	0.007	0.007	0.000

Stage-Discharge for Pond 3P: SWM Pond

Elevation (meters)	Discharge (m³/s)	Primary (m³/s)	Secondary (m³/s)	Elevation (meters)	Discharge (m³/s)	Primary (m³/s)	Secondary (m³/s)
177.250	0.000	0.000	0.000	179.900	0.474	0.044	0.430
177.300	0.002	0.002	0.000	179.950	0.485	0.045	0.440
177.350	0.006	0.006	0.000	180.000	0.496	0.045	0.451
177.400	0.008	0.008	0.000	180.050	0.507	0.046	0.461
177.450	0.010	0.010	0.000	180.100	0.518	0.046	0.472
177.500	0.012	0.012	0.000	180.150	0.529	0.047	0.483
177.550	0.014	0.014	0.000	180.200	0.540	0.047	0.493
177.600	0.015	0.015	0.000	180.250	0.551	0.047	0.504
177.650	0.016	0.016	0.000	180.300	0.562	0.048	0.514
177.700	0.017	0.017	0.000	180.350	**0.573**	**0.048**	**0.525**
177.750	0.018	0.018	0.000				
177.800	0.019	0.019	0.000				
177.850	0.020	0.020	0.000				
177.900	0.030	0.021	0.009				
177.950	0.039	0.022	0.017				
178.000	0.050	0.023	0.028				
178.050	0.062	0.024	0.038				
178.100	0.073	0.025	0.049				
178.150	0.084	0.025	0.059				
178.200	0.096	0.026	0.069				
178.250	0.107	0.027	0.080				
178.300	0.119	0.028	0.091				
178.350	0.130	0.028	0.102				
178.400	0.141	0.029	0.113				
178.450	0.153	0.030	0.123				
178.500	0.163	0.030	0.133				
178.550	0.174	0.031	0.143				
178.600	0.185	0.031	0.153				
178.650	0.196	0.032	0.164				
178.700	0.207	0.033	0.174				
178.750	0.218	0.033	0.185				
178.800	0.229	0.034	0.196				
178.850	0.240	0.034	0.206				
178.900	0.251	0.035	0.217				
178.950	0.263	0.035	0.227				
179.000	0.274	0.036	0.238				
179.050	0.285	0.036	0.248				
179.100	0.296	0.037	0.259				
179.150	0.307	0.037	0.270				
179.200	0.318	0.038	0.280				
179.250	0.329	0.038	0.291				
179.300	0.340	0.039	0.301				
179.350	0.351	0.039	0.312				
179.400	0.363	0.040	0.323				
179.450	0.374	0.040	0.333				
179.500	0.385	0.041	0.344				
179.550	0.396	0.041	0.355				
179.600	0.407	0.042	0.365				
179.650	0.418	0.042	0.376				
179.700	0.430	0.043	0.387				
179.750	0.441	0.043	0.398				
179.800	0.452	0.044	0.408				
179.850	0.463	0.044	0.419				

Stage-Area-Storage for Pond 3P: SWM Pond

Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)
177.250	0.0	178.310	4,857.6	179.370	10,867.8
177.270	74.3	178.330	4,964.5	179.390	10,988.6
177.290	148.6	178.350	5,071.4	179.410	11,109.4
177.310	223.0	178.370	5,178.3	179.430	11,230.2
177.330	297.3	178.390	5,285.2	179.450	11,351.0
177.350	371.6	178.410	5,392.0	179.470	11,471.8
177.370	445.9	178.430	5,498.9	179.490	**11,592.6**
177.390	520.2	178.450	5,605.8	179.510	**11,653.0**
177.410	594.6	178.470	5,712.7	179.530	11,653.0
177.430	668.9	178.490	5,819.6	179.550	11,653.0
177.450	743.2	178.510	5,928.2	179.570	11,653.0
177.470	817.5	178.530	6,038.6	179.590	11,653.0
177.490	891.8	178.550	6,149.0	179.610	11,653.0
177.510	971.4	178.570	6,259.4	179.630	11,653.0
177.530	1,056.3	178.590	6,369.8	179.650	11,653.0
177.550	1,141.2	178.610	6,480.2	179.670	11,653.0
177.570	1,226.1	178.630	6,590.6	179.690	11,653.0
177.590	1,311.0	178.650	6,701.0	179.710	11,653.0
177.610	1,395.9	178.670	6,811.4	179.730	11,653.0
177.630	1,480.8	178.690	6,921.8	179.750	11,653.0
177.650	1,565.7	178.710	7,032.2	179.770	11,653.0
177.670	1,650.6	178.730	7,142.6	179.790	11,653.0
177.690	1,739.0	178.750	7,253.0	179.810	11,653.0
177.710	1,831.0	178.770	7,366.9	179.830	11,653.0
177.730	1,923.0	178.790	7,480.8	179.850	11,653.0
177.750	2,015.0	178.810	7,594.8	179.870	11,653.0
177.770	2,113.2	178.830	7,708.7	179.890	11,653.0
177.790	2,211.5	178.850	7,822.6	179.910	11,653.0
177.810	2,309.7	178.870	7,936.5	179.930	11,653.0
177.830	2,408.0	178.890	8,050.4	179.950	11,653.0
177.850	2,506.2	178.910	8,164.4	179.970	11,653.0
177.870	2,604.4	178.930	8,278.3	179.990	11,653.0
177.890	2,702.7	178.950	8,392.2	180.010	11,653.0
177.910	2,800.9	178.970	8,506.1	180.030	11,653.0
177.930	2,899.2	178.990	8,620.0	180.050	11,653.0
177.950	2,997.4	179.010	8,735.6	180.070	11,653.0
177.970	3,095.6	179.030	8,852.9	180.090	11,653.0
177.990	3,193.9	179.050	8,970.2	180.110	11,653.0
178.010	3,294.8	179.070	9,087.5	180.130	11,653.0
178.030	3,398.3	179.090	9,204.8	180.150	11,653.0
178.050	3,501.8	179.110	9,322.0	180.170	11,653.0
178.070	3,605.3	179.130	9,439.3	180.190	11,653.0
178.090	3,708.8	179.150	9,556.6	180.210	11,653.0
178.110	3,812.4	179.170	9,673.9	180.230	11,653.0
178.130	3,915.9	179.190	9,791.2	180.250	11,653.0
178.150	4,019.4	179.210	9,908.4	180.270	11,653.0
178.170	4,122.9	179.230	10,025.7	180.290	11,653.0
178.190	4,226.4	179.250	10,143.0	180.310	11,653.0
178.210	4,330.0	179.270	10,263.8	180.330	11,653.0
178.230	4,433.5	179.290	10,384.6	180.350	11,653.0
178.250	4,537.0	179.310	10,505.4		
178.270	4,643.9	179.330	10,626.2		
178.290	4,750.8	179.350	10,747.0		

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: EIR Boundary Runoff Area=10.2300 ha 84.85% Impervious Runoff Depth=12 mm
Tc=10.0 min CN=94 Runoff=0.639 m³/s 1.275 Ml

Pond 3P: SWM Pond Peak Elev=177.481 m Storage=857.0 m³ Inflow=0.639 m³/s 1.275 Ml
Primary=0.011 m³/s 1.173 Ml Secondary=0.000 m³/s 0.000 Ml Outflow=0.011 m³/s 1.173 Ml

Total Runoff Area = 10.2300 ha Runoff Volume = 1.275 Ml Average Runoff Depth = 12 mm
15.15% Pervious = 1.5500 ha 84.85% Impervious = 8.6800 ha

Summary for Subcatchment 4S: EIR Boundary

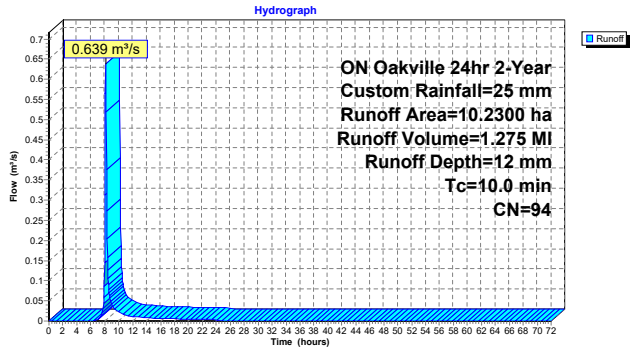
Runoff = 0.639 m³/s @ 8.14 hrs, Volume= 1.275 Ml, Depth= 12 mm
Routed to Pond 3P : SWM Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
ON Oakville 24hr 2-Year Custom Rainfall=25 mm

	Area (ha)	CN	Description
*	8.6800	98	
*	1.5500	74	
	10.2300	94	Weighted Average
	1.5500		15.15% Pervious Area
	8.6800		84.85% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment 4S: EIR Boundary



Hydrograph for Subcatchment 4S: EIR Boundary

Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)	Time (hours)	Precip. (mm)	Excess (mm)	Runoff (m³/s)
0.00	0	0	0.000	53.00	25	12	0.000
1.00	0	0	0.000	54.00	25	12	0.000
2.00	1	0	0.000	55.00	25	12	0.000
3.00	1	0	0.000	56.00	25	12	0.000
4.00	1	0	0.000	57.00	25	12	0.000
5.00	2	0	0.000	58.00	25	12	0.000
6.00	3	0	0.000	59.00	25	12	0.000
7.00	4	0	0.003	60.00	25	12	0.000
8.00	12	3	**0.146**	61.00	25	12	0.000
9.00	19	8	**0.042**	62.00	25	12	0.000
10.00	20	9	0.021	63.00	25	12	0.000
11.00	21	9	0.015	64.00	25	12	0.000
12.00	22	10	0.012	65.00	25	12	0.000
13.00	22	10	0.010	66.00	25	12	0.000
14.00	23	11	0.008	67.00	25	12	0.000
15.00	23	11	0.007	68.00	25	12	0.000
16.00	23	11	0.007	69.00	25	12	0.000
17.00	24	11	0.006	70.00	25	12	0.000
18.00	24	12	0.006	71.00	25	12	0.000
19.00	24	12	0.005	72.00	25	12	0.000
20.00	24	12	0.005				
21.00	24	12	0.004				
22.00	25	12	0.004				
23.00	25	12	0.004				
24.00	**25**	**12**	0.004				
25.00	25	12	0.000				
26.00	25	12	0.000				
27.00	25	12	0.000				
28.00	25	12	0.000				
29.00	25	12	0.000				
30.00	25	12	0.000				
31.00	25	12	0.000				
32.00	25	12	0.000				
33.00	25	12	0.000				
34.00	25	12	0.000				
35.00	25	12	0.000				
36.00	25	12	0.000				
37.00	25	12	0.000				
38.00	25	12	0.000				
39.00	25	12	0.000				
40.00	25	12	0.000				
41.00	25	12	0.000				
42.00	25	12	0.000				
43.00	25	12	0.000				
44.00	25	12	0.000				
45.00	25	12	0.000				
46.00	25	12	0.000				
47.00	25	12	0.000				
48.00	25	12	0.000				
49.00	25	12	0.000				
50.00	25	12	0.000				
51.00	25	12	0.000				
52.00	25	12	0.000				

Summary for Pond 3P: SWM Pond

Inflow Area = 10.2300 ha, 84.85% Impervious, Inflow Depth = 12 mm for Custom event
Inflow = 0.639 m³/s @ 8.14 hrs, Volume= 1.275 Ml
Outflow = 0.011 m³/s @ 12.08 hrs, Volume= 1.173 Ml, Atten= 98%, Lag= 236.0 min
Primary = 0.011 m³/s @ 12.08 hrs, Volume= 1.173 Ml
Secondary = 0.000 m³/s @ 0.00 hrs, Volume= 0.000 Ml

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 177.481 m @ 12.08 hrs Storage= 857.0 m³

Plug-Flow detention time= 997.3 min calculated for 1.173 Ml (92% of inflow)
Center-of-Mass det. time= 942.8 min (1,566.2 - 623.4)

Volume	Invert	Avail.Storage	Storage Description
#1	177.250 m	11,653.0 m³	**Custom Stage Data** Listed below

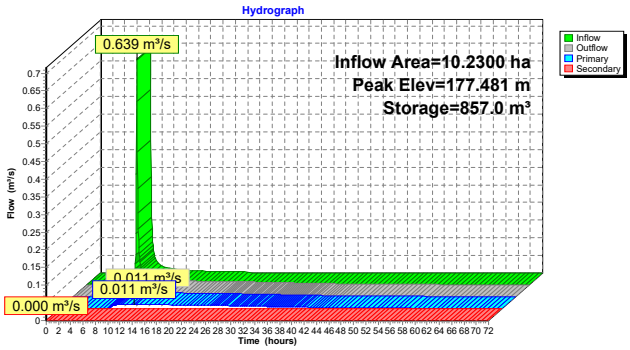
Elevation (meters)	Cum.Store (cubic-meters)
177.250	0.0
177.500	929.0
177.680	1,693.0
177.750	2,015.0
178.000	3,243.0
178.250	4,537.0
178.500	5,873.0
178.750	7,253.0
179.000	8,677.0
179.250	10,143.0
179.500	11,653.0

Device	Routing	Invert	Outlet Devices
#1	Primary	177.250 m	**115 mm Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Secondary	177.850 m	**Special & User-Defined** Head (meters) 0.000 0.100 0.200 0.300 0.400 0.500 0.600 0.700 0.800 0.900 1.000 1.500 2.000 2.500 Disch. (m³/s) 0.00000 0.01700 0.03800 0.05900 0.08000 0.10200 0.12300 0.14300 0.16400 0.18500 0.20600 0.31200 0.41900 0.52500

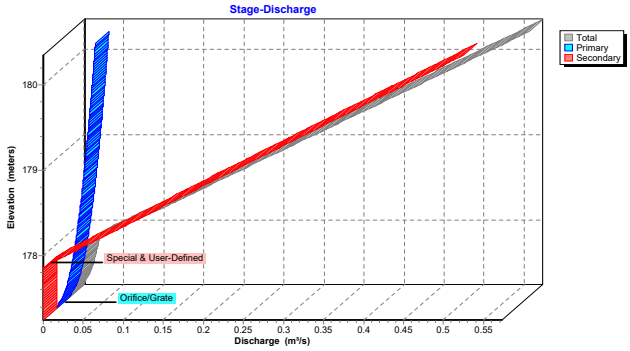
Primary OutFlow Max=0.011 m³/s @ 12.08 hrs HW=177.481 m (Free Discharge)
↑**1=Orifice/Grate** (Orifice Controls 0.011 m³/s @ 1.11 m/s)

Secondary OutFlow Max=0.000 m³/s @ 0.00 hrs HW=177.250 m (Free Discharge)
↑**2=Special & User-Defined** (Controls 0.000 m³/s)

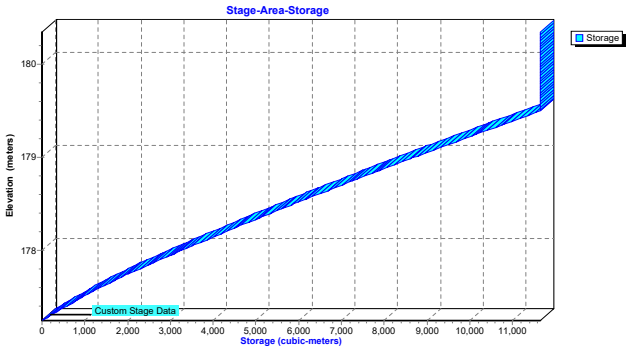
Pond 3P: SWM Pond



Pond 3P: SWM Pond



Pond 3P: SWM Pond



Hydrograph for Pond 3P: SWM Pond

Time (hours)	Inflow (m³/s)	Storage (cubic-meters)	Elevation (meters)	Outflow (m³/s)	Primary (m³/s)	Secondary (m³/s)
0.00	0.000	0.0	177.250	0.000	0.000	**0.000**
2.50	0.000	0.0	177.250	0.000	0.000	0.000
5.00	0.000	0.0	177.250	0.000	0.000	0.000
7.50	**0.012**	13.6	177.254	0.000	0.000	0.000
10.00	**0.021**	**828.0**	**177.473**	**0.011**	**0.011**	0.000
12.50	0.011	**856.3**	**177.480**	**0.011**	**0.011**	0.000
15.00	0.007	832.4	177.474	0.011	0.011	0.000
17.50	0.006	791.0	177.463	0.011	0.011	0.000
20.00	0.005	742.1	177.450	0.010	0.010	0.000
22.50	0.004	690.4	177.436	0.010	0.010	0.000
25.00	0.000	627.4	177.419	0.009	0.009	0.000
27.50	0.000	548.7	177.398	0.008	0.008	0.000
30.00	0.000	478.2	177.379	0.007	0.007	0.000
32.50	0.000	416.1	177.362	0.006	0.006	0.000
35.00	0.000	362.0	177.347	0.006	0.006	0.000
37.50	0.000	316.9	177.335	0.005	0.005	0.000
40.00	0.000	279.9	177.325	0.004	0.004	0.000
42.50	0.000	249.5	177.317	0.003	0.003	0.000
45.00	0.000	224.3	177.310	0.003	0.003	0.000
47.50	0.000	203.3	177.305	0.002	0.002	0.000
50.00	0.000	185.5	177.300	0.002	0.002	0.000
52.50	0.000	170.4	177.296	0.002	0.002	0.000
55.00	0.000	157.4	177.292	0.001	0.001	0.000
57.50	0.000	146.1	177.289	0.001	0.001	0.000
60.00	0.000	136.3	177.287	0.001	0.001	0.000
62.50	0.000	127.6	177.284	0.001	0.001	0.000
65.00	0.000	119.9	177.282	0.001	0.001	0.000
67.50	0.000	113.0	177.280	0.001	0.001	0.000
70.00	0.000	106.9	177.279	0.001	0.001	0.000

Stage-Discharge for Pond 3P: SWM Pond

Elevation (meters)	Discharge (m³/s)	Primary (m³/s)	Secondary (m³/s)
177.250	0.000	0.000	0.000
177.300	0.002	0.002	0.000
177.350	0.006	0.006	0.000
177.400	0.008	0.008	0.000
177.450	0.010	0.010	0.000
177.500	0.012	0.012	0.000
177.550	0.014	0.014	0.000
177.600	0.015	0.015	0.000
177.650	0.016	0.016	0.000
177.700	0.017	0.017	0.000
177.750	0.018	0.018	0.000
177.800	0.019	0.019	0.000
177.850	0.020	0.020	0.000
177.900	0.030	0.021	0.009
177.950	0.039	0.022	0.017
178.000	0.050	0.023	0.028
178.050	0.062	0.024	0.038
178.100	0.073	0.025	0.049
178.150	0.084	0.025	0.059
178.200	0.096	0.026	0.069
178.250	0.107	0.027	0.080
178.300	0.119	0.028	0.091
178.350	0.130	0.028	0.102
178.400	0.141	0.029	0.113
178.450	0.153	0.030	0.123
178.500	0.163	0.030	0.133
178.550	0.174	0.031	0.143
178.600	0.185	0.031	0.153
178.650	0.196	0.032	0.164
178.700	0.207	0.033	0.174
178.750	0.218	0.033	0.185
178.800	0.229	0.034	0.196
178.850	0.240	0.034	0.206
178.900	0.251	0.035	0.217
178.950	0.263	0.035	0.227
179.000	0.274	0.036	0.238
179.050	0.285	0.036	0.248
179.100	0.296	0.037	0.259
179.150	0.307	0.037	0.270
179.200	0.318	0.038	0.280
179.250	0.329	0.038	0.291
179.300	0.340	0.039	0.301
179.350	0.351	0.039	0.312
179.400	0.363	0.040	0.323
179.450	0.374	0.040	0.333
179.500	0.385	0.041	0.344
179.550	0.396	0.041	0.355
179.600	0.407	0.042	0.365
179.650	0.418	0.042	0.376
179.700	0.430	0.043	0.387
179.750	0.441	0.043	0.398
179.800	0.452	0.044	0.408
179.850	0.463	0.044	0.419
179.900	0.474	0.044	0.430
179.950	0.485	0.045	0.440
180.000	0.496	0.045	0.451
180.050	0.507	0.046	0.461
180.100	0.518	0.046	0.472
180.150	0.529	0.047	0.483
180.200	0.540	0.047	0.493
180.250	0.551	0.047	0.504
180.300	0.562	0.048	0.514
180.350	**0.573**	**0.048**	**0.525**

Stage-Area-Storage for Pond 3P: SWM Pond

Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)	Elevation (meters)	Storage (cubic-meters)
177.250	0.0	178.310	4,857.6	179.370	10,867.8
177.270	74.3	178.330	4,964.5	179.390	10,988.6
177.290	148.6	178.350	5,071.4	179.410	11,109.4
177.310	223.0	178.370	5,178.3	179.430	11,230.2
177.330	297.3	178.390	5,285.2	179.450	11,351.0
177.350	371.6	178.410	5,392.0	179.470	11,471.8
177.370	445.9	178.430	5,498.9	179.490	**11,592.6**
177.390	520.2	178.450	5,605.8	179.510	**11,653.0**
177.410	594.6	178.470	5,712.7	179.530	11,653.0
177.430	668.9	178.490	5,819.6	179.550	11,653.0
177.450	743.2	178.510	5,928.2	179.570	11,653.0
177.470	817.5	178.530	6,038.6	179.590	11,653.0
177.490	891.8	178.550	6,149.0	179.610	11,653.0
177.510	971.4	178.570	6,259.4	179.630	11,653.0
177.530	1,056.3	178.590	6,369.8	179.650	11,653.0
177.550	1,141.2	178.610	6,480.2	179.670	11,653.0
177.570	1,226.1	178.630	6,590.6	179.690	11,653.0
177.590	1,311.0	178.650	6,701.0	179.710	11,653.0
177.610	1,395.9	178.670	6,811.4	179.730	11,653.0
177.630	1,480.8	178.690	6,921.8	179.750	11,653.0
177.650	1,565.7	178.710	7,032.2	179.770	11,653.0
177.670	1,650.6	178.730	7,142.6	179.790	11,653.0
177.690	1,739.0	178.750	7,253.0	179.810	11,653.0
177.710	1,831.0	178.770	7,366.9	179.830	11,653.0
177.730	1,923.0	178.790	7,480.8	179.850	11,653.0
177.750	2,015.0	178.810	7,594.8	179.870	11,653.0
177.770	2,113.2	178.830	7,708.7	179.890	11,653.0
177.790	2,211.5	178.850	7,822.6	179.910	11,653.0
177.810	2,309.7	178.870	7,936.5	179.930	11,653.0
177.830	2,408.0	178.890	8,050.4	179.950	11,653.0
177.850	2,506.2	178.910	8,164.4	179.970	11,653.0
177.870	2,604.4	178.930	8,278.3	179.990	11,653.0
177.890	2,702.7	178.950	8,392.2	180.010	11,653.0
177.910	2,800.9	178.970	8,506.1	180.030	11,653.0
177.930	2,899.2	178.990	8,620.0	180.050	11,653.0
177.950	2,997.4	179.010	8,735.6	180.070	11,653.0
177.970	3,095.6	179.030	8,852.9	180.090	11,653.0
177.990	3,193.9	179.050	8,970.2	180.110	11,653.0
178.010	3,294.8	179.070	9,087.5	180.130	11,653.0
178.030	3,398.3	179.090	9,204.8	180.150	11,653.0
178.050	3,501.8	179.110	9,322.0	180.170	11,653.0
178.070	3,605.3	179.130	9,439.3	180.190	11,653.0
178.090	3,708.8	179.150	9,556.6	180.210	11,653.0
178.110	3,812.4	179.170	9,673.9	180.230	11,653.0
178.130	3,915.9	179.190	9,791.2	180.250	11,653.0
178.150	4,019.4	179.210	9,908.4	180.270	11,653.0
178.170	4,122.9	179.230	10,025.7	180.290	11,653.0
178.190	4,226.4	179.250	10,143.0	180.310	11,653.0
178.210	4,330.0	179.270	10,263.8	180.330	11,653.0
178.230	4,433.5	179.290	10,384.6	180.350	11,653.0
178.250	4,537.0	179.310	10,505.4		
178.270	4,643.9	179.330	10,626.2		
178.290	4,750.8	179.350	10,747.0		

TRAFALGAR ENGINEERING

Our File: 1805
December 4, 2023

Stage-Storage-Discharge (Pond Volume Calculations)

STORM EVENT	ELEVATION (m)	FOREBAY AREA (m^2)	FOREBAY VOL (m^3)	MAIN POND AREA (m^2)	MAIN POND VOL (m^3)	TOTAL AREA (m^2)	TOTAL VOL (m^3)	CUM. VOL. (m^3)	ACTIVE STORAGE (m^3)	Q_{Total} (m^3/s)
	175.75	252	0			252	0	0		
	176.00	332	73			332	73	73		
	176.05	352	17	1044	0	1396	43	116		
	176.25	423	77	1244	229	1667	306	422		
	176.50	517	118	1500	343	2017	461	883		
	176.75	616	142	1763	408	2379	550	1433		
	176.82	645	44	1838	126	2483	170	1603		
	177.00	794	130	2110	355	2904	485	2088		
PWL	177.25	911	213	2508	577	3419	790	2878	0	0
25mm	177.48	1070	228	2670	595	3740	823	3701	825	0.011
	177.50	1076	21	2927	56	4003	77	3778	902	0.013
	177.68	1238	208	3243	555	4481	764	4542	1666	0.017
	177.75	1334	90	3404	233	4738	323	4865	1989	0.019
2-YEAR	177.85			4980	419	4980	486	5351	2475	0.021
	178.00			5091	755	5091	755	6106	3230	0.048
5-YEAR	178.01			5097	51	5097	51	6157	3281	0.053
10-YEAR	178.13			5178	617	5178	617	6774	3898	0.08
	178.25			5261	626	5261	626	7400	4524	0.1
25-YEAR	178.29			5287	211	5287	211	7611	4735	0.116
50-YEAR	178.39			5356	532	5356	532	8143	5267	0.139
100-YEAR	178.50			5432	593	5432	593	8736	5860	0.151
	178.75			5606	1380	5606	1380	10116	7240	0.201
	179.00			5780	1423	5780	1423	11539	8663	0.251
	179.25			5954	1467	5954	1467	13006	10130	0.302
	179.50			6130	1511	6130	1511	14517	11641	0.352

ORIFICE FLOW (110mm dia. ORIFICE)

A minimum size of 75 mm is permitted. The 110 mm orifice is located with its invert at the permanent pool NWL and serves to release the extended detention volume. Orifice discharge rates were calculated using the following formula:

$$Q = CA\sqrt{2gh}$$

Where
C=0.62
A=0.25 x 3.14 x D^2
g=9.81 m/s^2

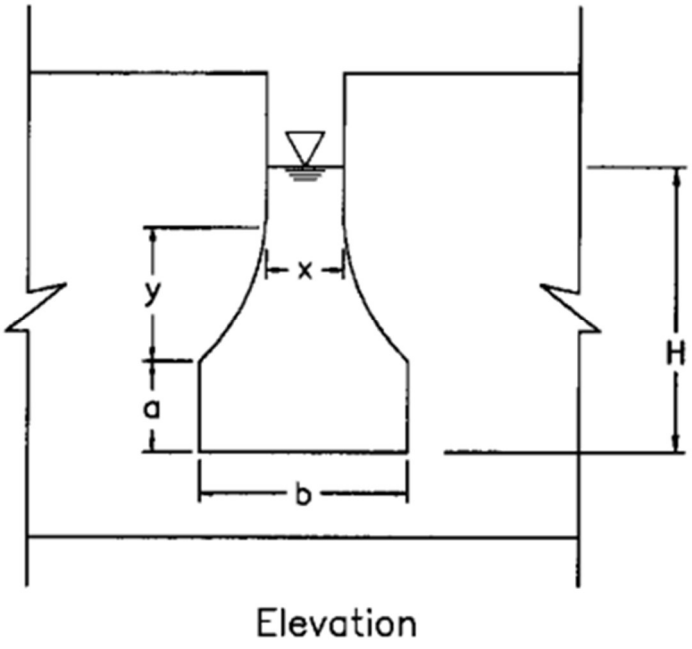
SUTRO WEIR SIZING

A proportional weir has been selected to maximize the storage efficiency of the pond. The weir invert was set to slightly above the 25 mm storm water level (determined using HydroCAD). Weir discharge rates were calculated using the following formula:

$$Q = C \times a^{0.5} \times b \times (H - a/3)$$

(FHWA HEC-22 Eq. 8-24)

Where
C = 2.74
a = 0.134m
b = 0.2m
$x/b = 1 - (0.315)\ [\ \arctan(y / a)^{0.5}]$



Elevation

Source: FHWA HEC-22 (p 8-28, 29)

TRAFALGAR ENGINEERING

Our File: 1805
December 4, 2023

POND MINIMUM SIZING (WATER QUALITY)

From MOE Stormwater Management Planning and Design Manual (March 2003): Table 3.2 for Wet Pond using Enhanced Removal and 85% Impervious, storage volume = 250 m^3/ha

Required Volume	= 250 m^3/ha x 10.2 ha = 2550 m^3
Extended Storage Volume	= 40 m^3/ha x 10.2 ha = 408 m^3
Permanent Pool Volume	= 210 m^3/ha x 10.2 ha = 2142 m^3

FOREBAY MINIMUM SIZING

1) SETTLING METHOD (MOE EQUATION 4.5)

$$\text{DIST} = \sqrt{\frac{rQ_p}{V_s}} = \sqrt{2 * \frac{0.011}{0.0003}} = 8.56 \text{ m}$$

Where
DIST = forebay length (m)
r = length-to-width ratio of forebay
Q_p = peak flow rate from the pond during 25mm storm (m^3/s)
V_s = settling velocity (0.0003 m/s)

2) DISPERSION LENGTH (10-YEAR STORM PIPE FLOW) (MOE EQUATION 4.6)

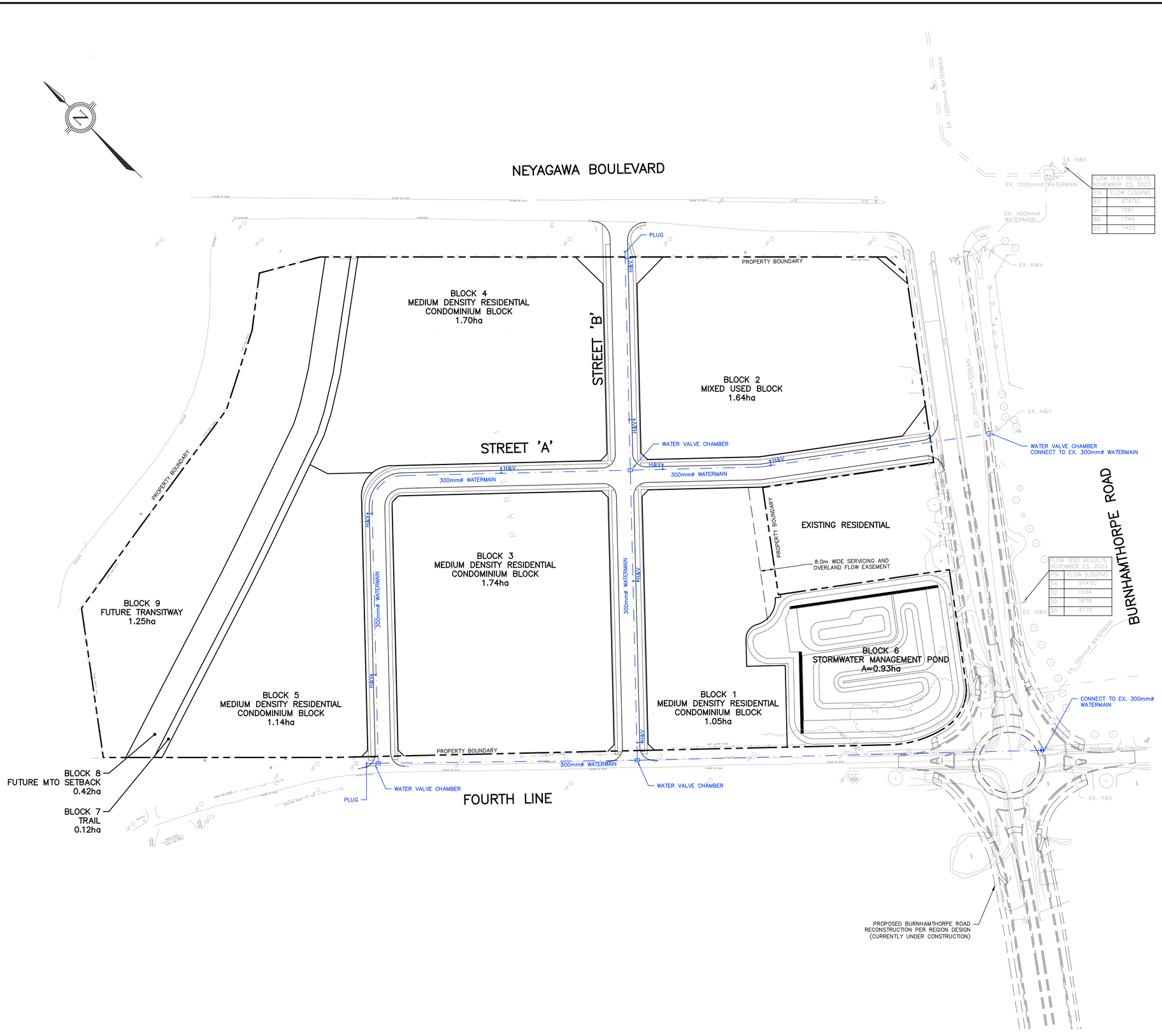
$$\text{DIST} = \frac{8Q}{dV_f} = \frac{8 \text{ x } 3.128}{1.5 \text{ x } 0.5} = 33.4 \text{ m}$$

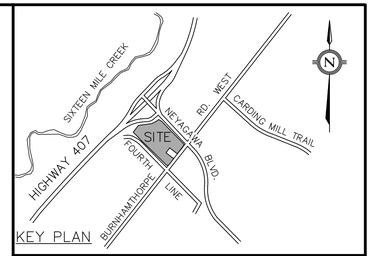
Where
DIST = length of dispersion (m)
Q =inlet flowrate (m^3/s) (10-year flow)
d = depth of the permanent pool in the forebay (m) (Table 4.8: min 1.0 m, **desired 1.5 m**)
V_f = desired velocity in the forebay (0.5 m/s)

3) MINMUM BOTTOM WIDTH

$$\text{WIDTH} = \frac{\text{DIST}}{8} = \frac{33.4}{8} = 4.2 \text{ m}$$

APPENDIX ‘E’





KEY PLAN

LEGEND

- EXISTING FIRE HYDRANT AND VALVE
- PROPOSED FIRE HYDRANT AND VALVE
- PROPOSED VALVE & BOX
- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- PROPERTY LINE

BENCHMARK

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MINISTRY OF TRANSPORTATION ONTARIO FIRST-ORDER VERTICAL BENCH MARK NUMBER 00819818114 HAVING AN ORTHOMETRIC ELEVATION OF 188.594 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928:1978).

STEEL ROD WITH BRASS CAP BENCH MARK ON NORTH SIDE OF BURNHAMTHORPE RD, 138.7 M EAST OF THE JCT OF BURNHAMTHORPE RD AND SIXTH LINE RD IN OAKVILLE, AND 9.2 M NORTH OF CENTRELINE OF BURNHAMTHORPE RD. BENCH MARK IS SET 1.1 M SOUTH OF NORTH RIGHT-OF-WAY FENCE OF BURNHAMTHORPE RD AND IS MARKED BY A STEEL MARKER 46 CM EAST OF BENCH MARK.

NOTE

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No	DD/MM/YY	By/DRN	REVISIONS
1	23/12/18	NAS/AJP	DRAFT PLAN OF SUBDIVISION

Design	NAS	Chk'd	JN
Drawn	AJP	Chk'd	NAS/JN
Scale	0 10 20 50m, 1:1000		
Cad File	1805S.dwg		
Plot Date	12/18/23		
References			
Field Notes			

APPROVALS

Bell ☐ Hydro ☐
Gas ☐ Cable ☐
Traf. ☐ Water ☐

LICENSED PROFESSIONAL ENGINEER
N. A. ISYLVESTER
100199487
DEC 18 2023
PROVINCE OF ONTARIO

Consultant

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Municipality

OAKVILLE Halton REGION

Title

ARGO NEYAGAWA

NEYAGAWA BLVD./BURNHAMTHORPE RD W
ARGO NEYAGAWA CORPORATION

CONCEPTUAL WATER SERVICING PLAN

Municipal No.	Regional No.
–	–
Contract No.	Consultant No. 1805
–	Sheet DRAWING 1

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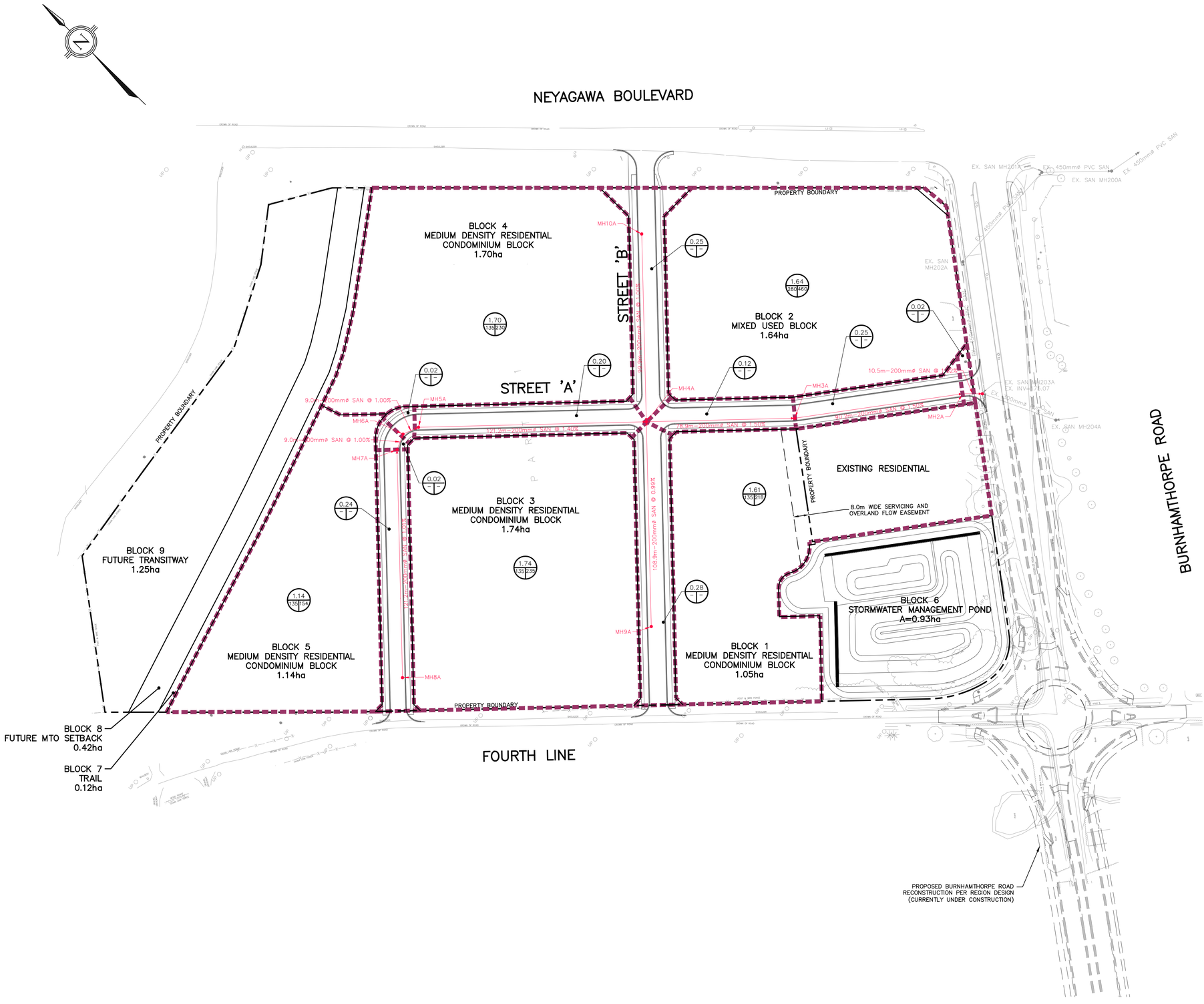

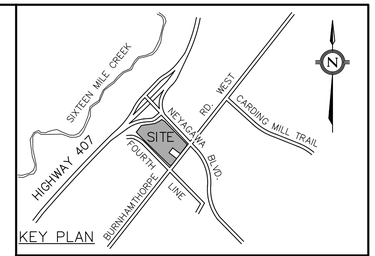

LEGEND

- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- PROPERTY LINE
- 1.64 / 280466 — SANITARY TRIBUTARY AREA IN HECTARES / EQUIVALENT POPULATION / POPULATION DENSITY (pp/ha)
- SANITARY DRAINAGE AREA BOUNDARY

BENCHMARK

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No	DD/MM/YY	By/DRN	REVISIONS
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Design: NAS	Chk'd: JN	Cad File:	1805S.dwg
Drawn: AJP	Chk'd: NAS/JN	Plot Date:	12/18/23
Scale: 0 10 20 50m, 1:1000		References	

APPROVALS

Field Notes

Bell ☐ Hydro ☐
Gas ☐ Cable ☐
Traf. ☐ Water ☐

LICENSED PROFESSIONAL ENGINEER
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DEC 18 2023
PROVINCE OF ONTARIO

Consultant

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Municipality

OAKVILLE Halton REGION

Title

ARGO NEYAGAWA
NEYAGAWA BLVD./BURNHAMTHORPE RD W
ARGO NEYAGAWA CORPORATION
CONCEPTUAL SANITARY SERVICING PLAN

Municipal No.	Regional No.
–	–
Contract No.	Consultant No. 1805
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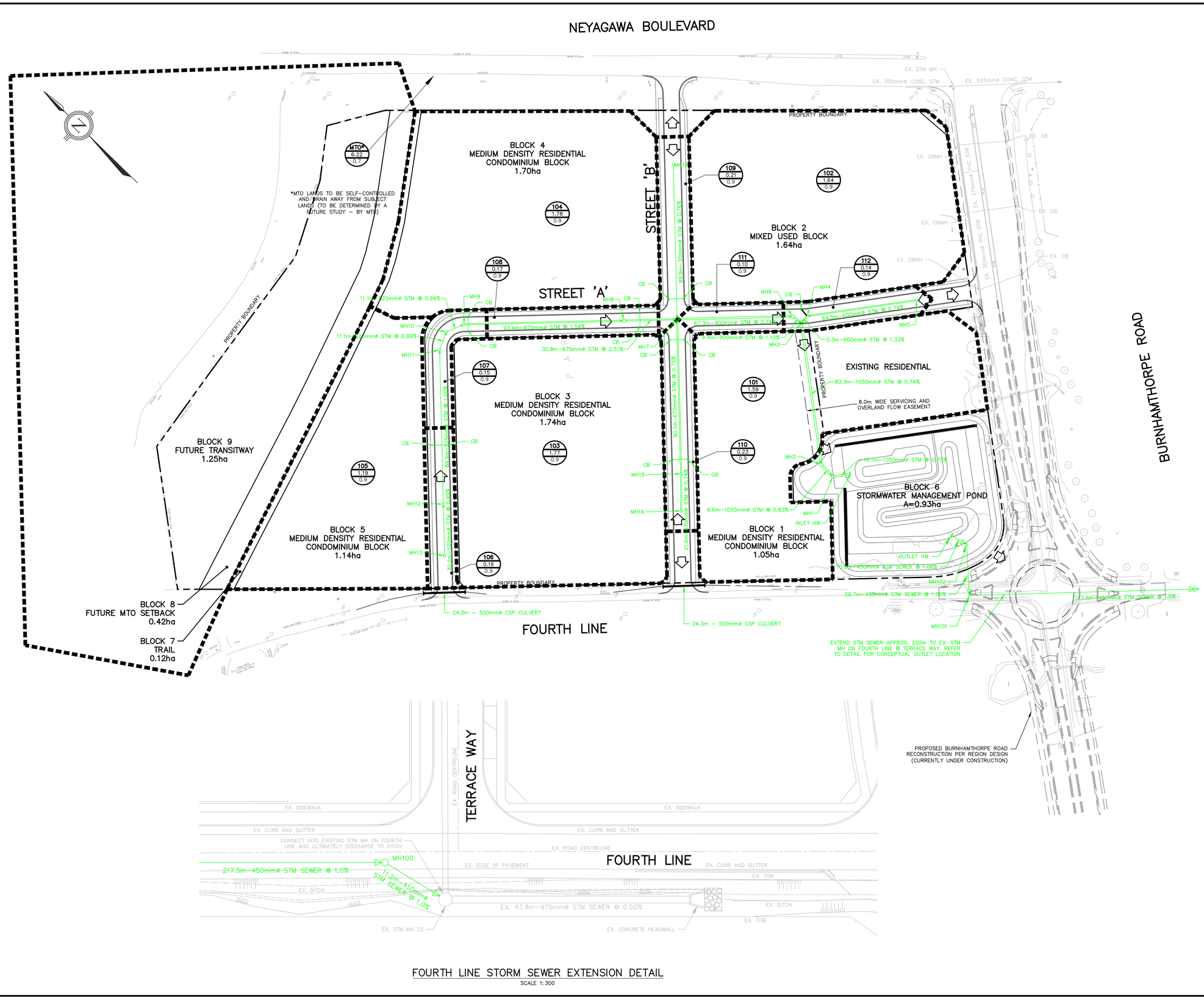
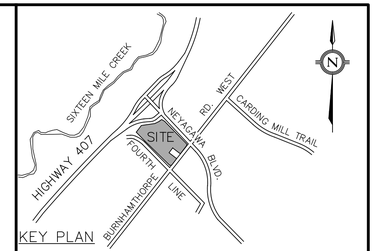


FOURTH LINE STORM SEWER EXTENSION DETAIL
SCALE 1:300



LEGEND

- EXISTING STORM MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN
- PROPOSED STORM MANHOLE
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- PROPERTY LINE
- STORM AREA NAME / STORM AREA IN HECTARES / STORM RUN-OFF COEFFICIENT (e.g. 103 / 1.77 / 0.9)
- PROPOSED STORM DRAINAGE AREA BOUNDARY
- MAJOR OVERLAND FLOW ROUTE

BENCHMARK

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Drawn	AJP	Chk'd	NAS/JN
Scale	0 10 20 50m, 1:1000		
Cad File	1805S.dwg		
Plot Date	12/18/23		
References			
Field Notes			

APPROVALS

Bell ☐ Hydro ☐
Gas ☐ Cable ☐
Traf. ☐ Water ☐

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Municipality
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Halton REGION

Title
ARGO NEYAGAWA
NEYAGAWA BLVD./BURNHAMTHORPE RD W
ARGO NEYAGAWA CORPORATION
CONCEPTUAL STORM SERVICING PLAN

Municipal No.	Regional No.
–	–
Contract No.	Consultant No.
–	1805
	Sheet DRAWING 3

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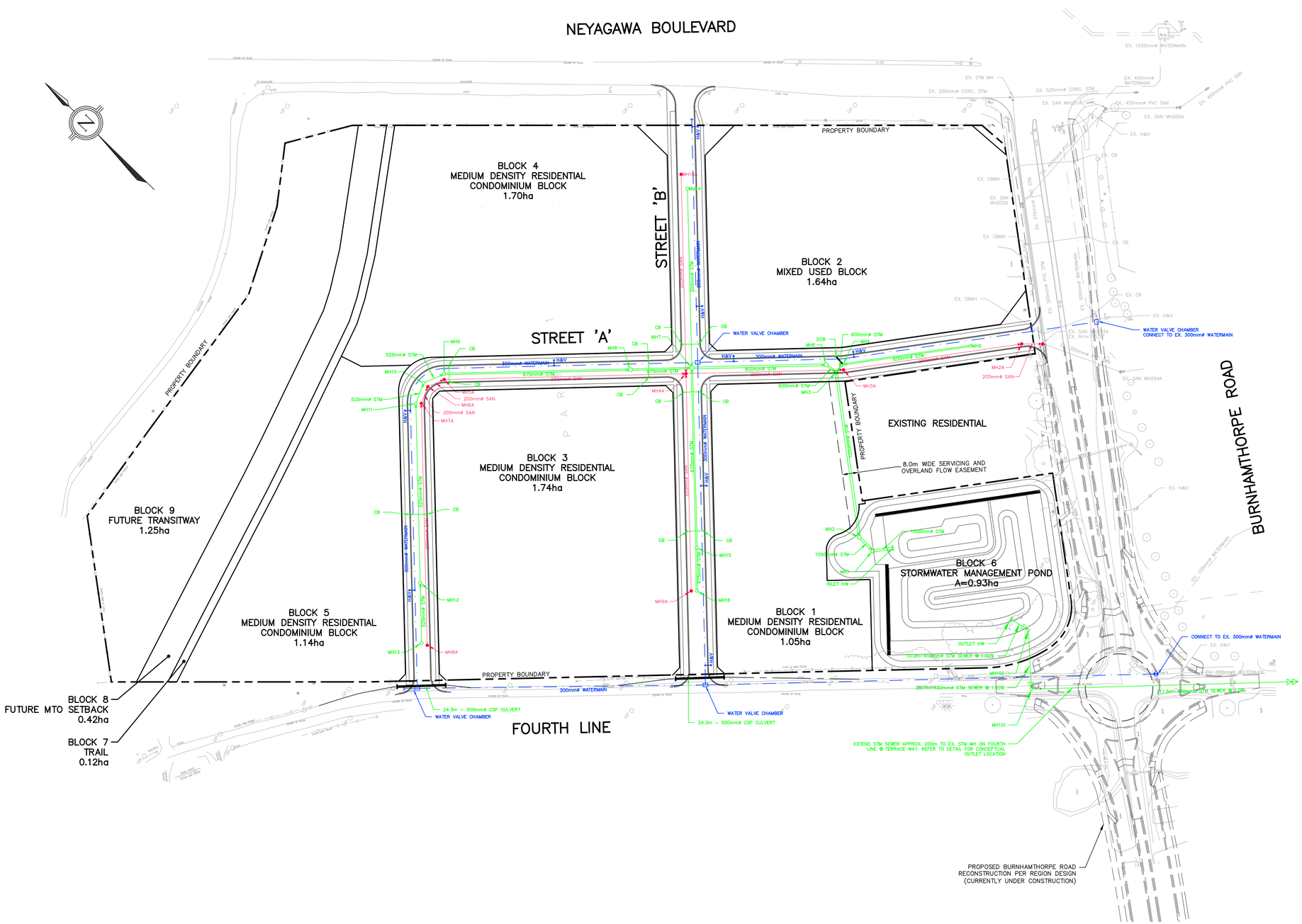

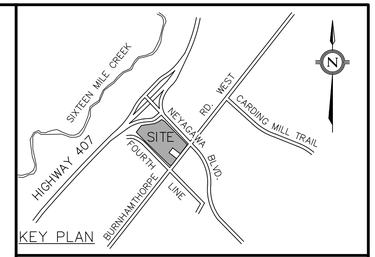

LEGEND

- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED FIRE HYDRANT AND VALVE
- PROPOSED VALVE & BOX
- PROPOSED BACKFLOW PREVENTER
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- PROPERTY LINE

BENCHMARK

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Design	NAS	Chk'd JN	Cad File 1805S.dwg
Drawn	AJP	Chk'd NAS/JN	Plot Date 12/18/23
Scale	0 10 20 50m, 1:1000		References

APPROVALS

Field Notes

Bell ☐ Hydro ☐
Gas ☐ Cable ☐
Traf. ☐ Water ☐

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Title

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CONCEPTUAL COMBINED SERVICING PLAN

Municipal No.	Regional No.
–	–
Contract No. –	Consultant No. 1805
	Sheet DRAWING 4

20M–

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PRELIMINARY URBAN SWM POND CROSS–SECTION A–A

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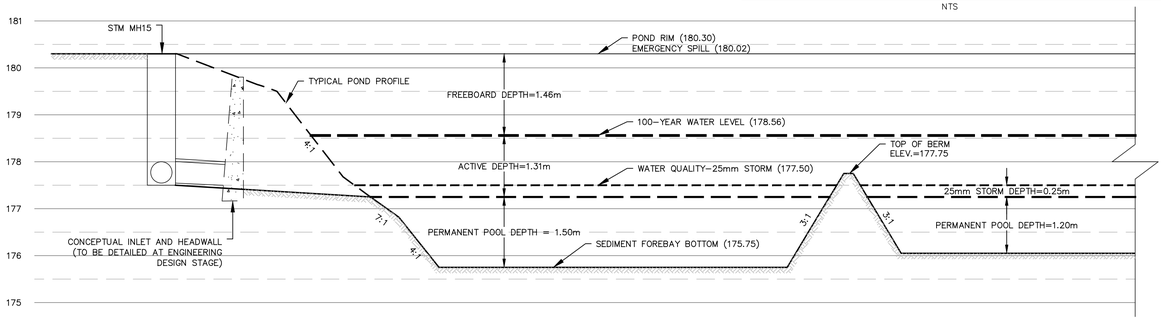

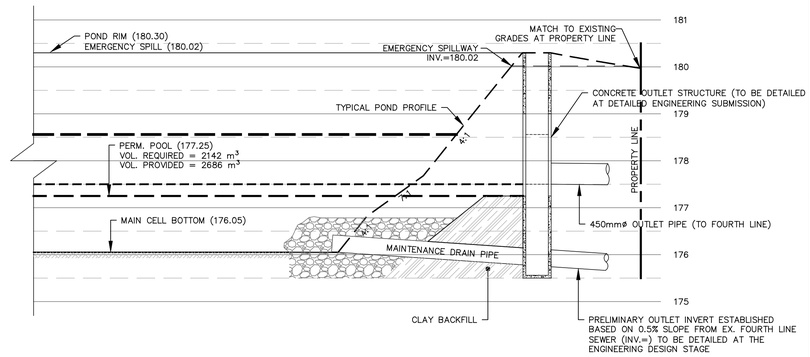

PRELIMINARY URBAN SWM POND CROSS–SECTION B–B

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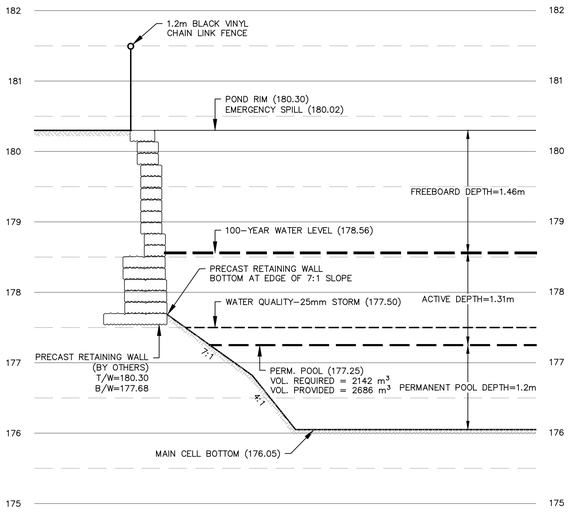

PLAN – URBAN STORMWATER MANAGEMENT POND

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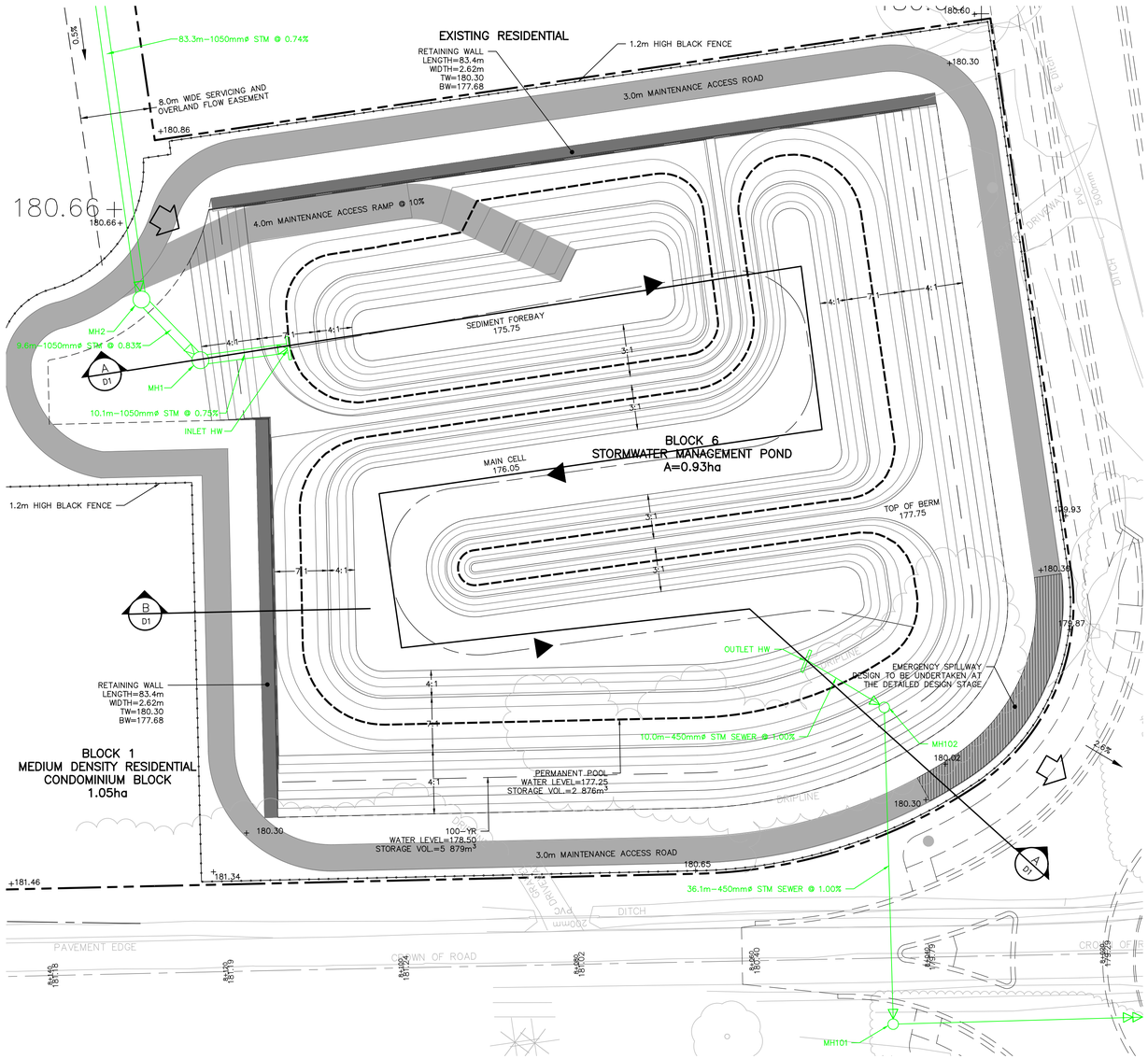

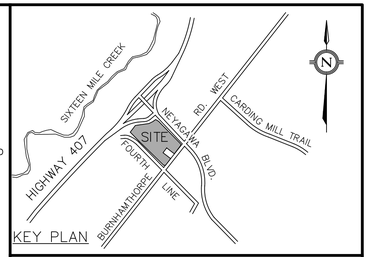

LEGEND

BENCHMARK

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Design	NAS	Chk'd	JN
Drawn	AJP	Chk'd	NAS/JN
Scale	0 10 20 50m, 1:1000		
Cad File	1805D.dwg		
Plot Date	12/18/23		
References			
Field Notes			

APPROVALS

Bell ☐ Hydro ☐
Gas ☐ Cable ☐
Traf. ☐ Water ☐

LICENSED PROFESSIONAL ENGINEER
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DEC 18 2023
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OAKVILLE Halton REGION

Title

ARGO NEYAGAWA
NEYAGAWA BLVD./BURNHAMTHORPE RD W
ARGO NEYAGAWA CORPORATION
CONCEPTUAL URBAN SWM POND

Municipal No.	Regional No.
–	–
Contract No.	Consultant No. 1805
–	Sheet DRAWING 5

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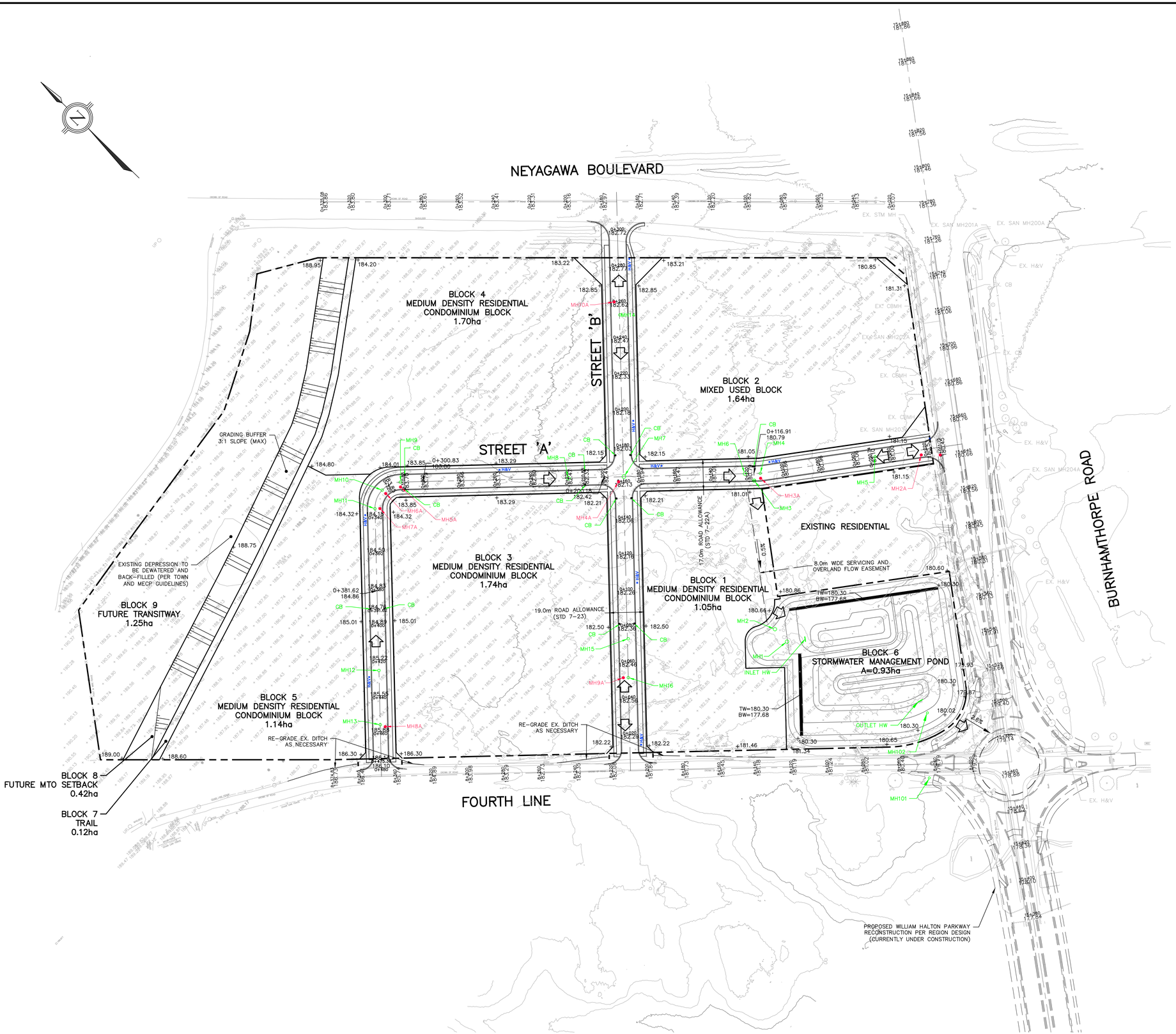

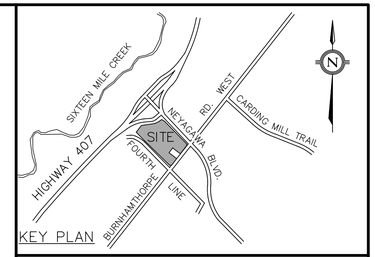

LEGEND

- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED FIRE HYDRANT AND VALVE
- PROPERTY LINE
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED 3:1 SLOPE
- 2% PROPOSED SLOPE

BENCHMARK

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Design	NAS	Chk'd	JN
Drawn	AJP	Chk'd	NAS/JN
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Cad File	1805G.dwg		
Plot Date	12/18/23		
References			
APPROVALS		Field Notes	

Bell ☐ Hydro ☐
Gas ☐ Cable ☐
Traf. ☐ Water ☐

LICENSED PROFESSIONAL ENGINEER
N. A. SYLVESTER
100199487
DEC 19 2023
PROVINCE OF ONTARIO

Consultant
TRAFALGAR ENGINEERING
#1-481 MORDEN ROAD, OAKVILLE, ON, L6K 3W6
www.trafalgareng.com

Municipality
OAKVILLE
Halton REGION

Title
ARGO NEYAGAWA
NEYAGAWA BLVD./BURNHAMTHORPE RD W
ARGO NEYAGAWA CORPORATION
CONCEPTUAL GRADING PLAN

Municipal No.	Regional No.
–	–
Contract No.	Consultant No. 1805
–	Sheet DRAWING 6

20M–

FILENAME: P:\1805 Argo Neyagawa\04-CAD\03-DPS\1805G.dwg
PLOTDATE: Dec 18, 2023 - 2:20pm

STREET 'B' CONCEPTUAL STREET PROFILE

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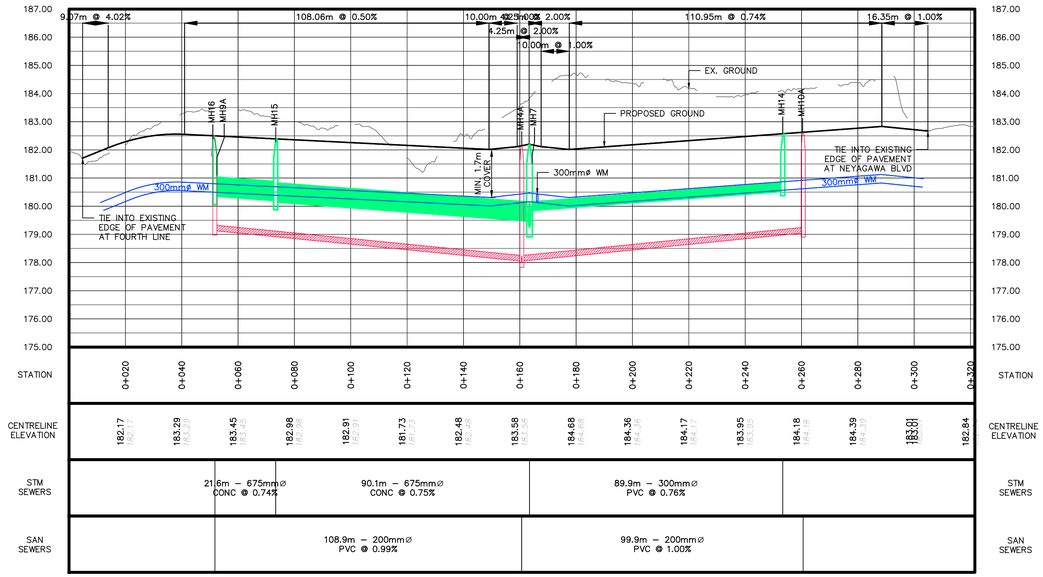

STREET 'A' CONCEPTUAL STREET PROFILE

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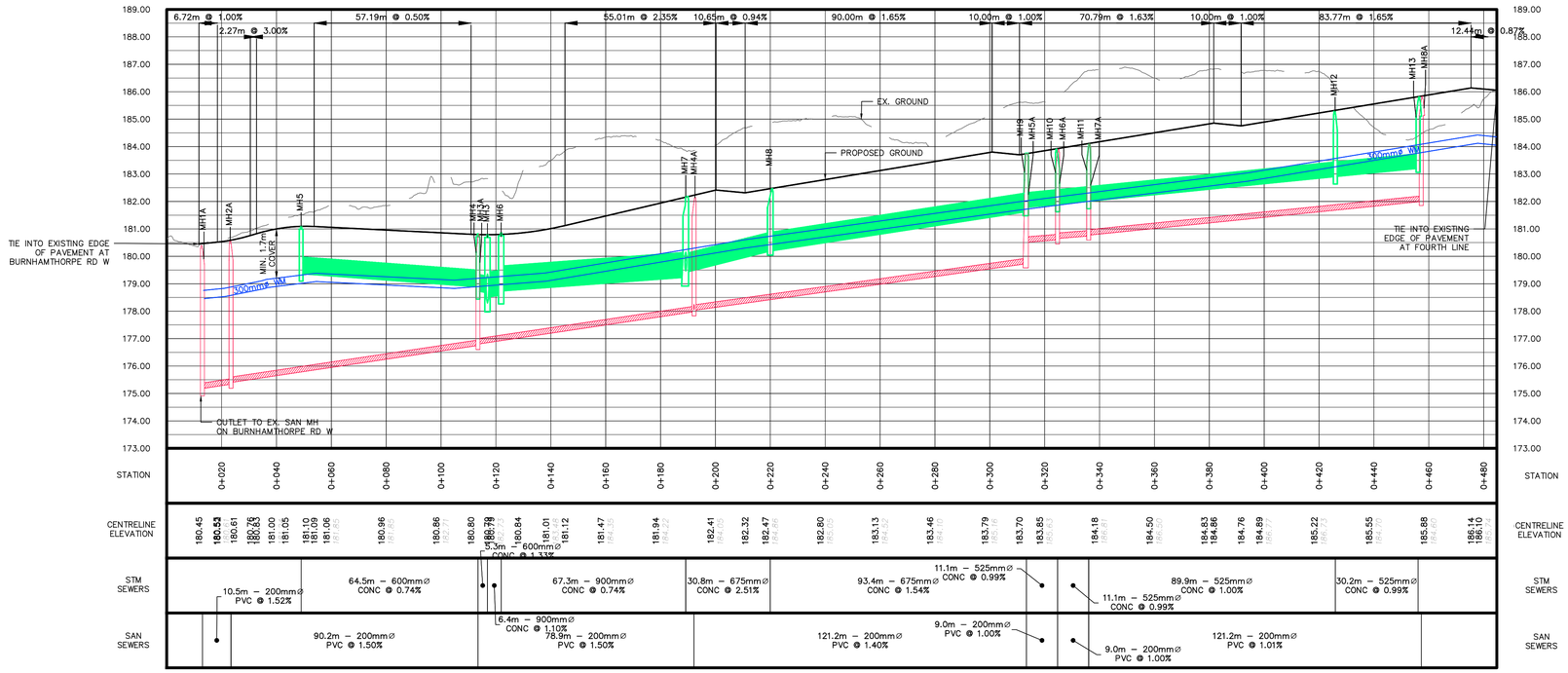

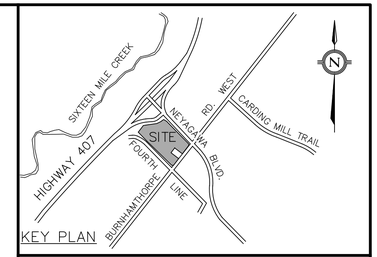

LEGEND

BENCHMARK

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MINISTRY OF TRANSPORTATION ONTARIO FIRST–ORDER VERTICAL BENCH MARK NUMBER 00819818114 HAVING AN ORTHOMETRIC ELEVATION OF 188.594 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD–1928:1978).

STEEL ROD WITH BRASS CAP BENCH MARK ON NORTH SIDE OF BURNHAMTHORPE RD, 138.7 M EAST OF THE JCT OF BURNHAMTHORPE RD AND SIXTH LINE RD IN OAKVILLE, AND 9.2 M NORTH OF CENTRELINE OF BURNHAMTHORPE RD. BENCH MARK IS SET 1.1 M SOUTH OF NORTH RIGHT–OF–WAY FENCE OF BURNHAMTHORPE RD AND IS MARKED BY A STEEL MARKER 46 CM EAST OF BENCH MARK.

NOTE

THE SURVEY WAS COMPLETED ON THE 19TH DAY OF AUGUST, 2022 BY R–PE SURVEYING LTD. ONTARIO LAND SURVEYORS. JOB NO. 22–064, CAD FILE: 22–064TP01

No	DD/MM/YY	By/DRN	REVISIONS
1	23/12/18	NAS/AJP	DRAFT PLAN OF SUBDIVISION

Design	NAS	Chk'd	JN
Drawn	AJP	Chk'd	NAS/JN
Scale	0 10 20 50m, 1:1000		

Cad File: 1805D.dwg
Plot Date: 12/18/23
References
Field Notes

APPROVALS

Bell ☐ Hydro ☐
Gas ☐ Cable ☐
Traf. ☐ Water ☐

LICENSED PROFESSIONAL ENGINEER
N. A. SYLVESTER
100199487
DEC 18 2023
PROVINCE OF ONTARIO

Consultant
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www.trafalgareng.com

Municipality
OAKVILLE
Halton REGION

Title
ARGO NEYAGAWA
NEYAGAWA BLVD./BURNHAMTHORPE RD W
ARGO NEYAGAWA CORPORATION
CONCEPTUAL STREET PROFILES

Municipal No.	Regional No.
–	–
Contract No.	Consultant No.
–	1805

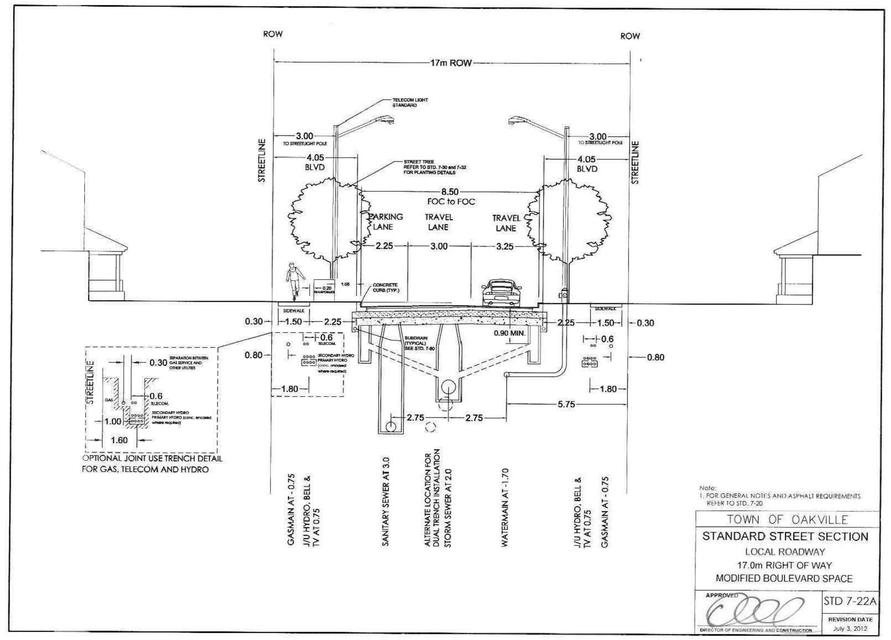
Sheet DRAWING 7

20M–

FILENAME: P:\1805 Argo Neyagawa\04-CAD\03-DPS\1805D.dwg
PLOTDATE: Dec 18, 2023 - 9:29am

TYPICAL 17.0m RIGHT–OF–WAY SECTION

NTS



TYPICAL 19.0m RIGHT–OF–WAY SECTION

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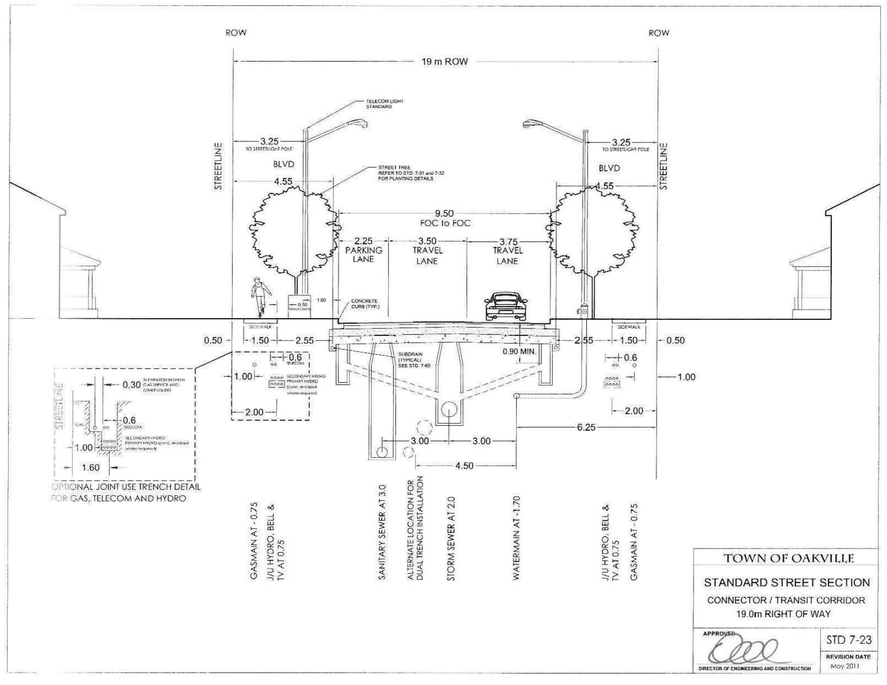

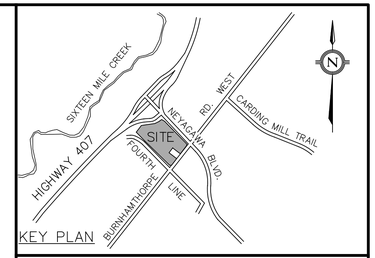

KEY PLAN

LEGEND

BENCHMARK

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MINISTRY OF TRANSPORTATION ONTARIO FIRST–ORDER VERTICAL BENCH MARK NUMBER 00819818114 HAVING AN ORTHOMETRIC ELEVATION OF 188.594 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD–1928:1978).

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No	DD/MM/YY	By/DRN	REVISIONS
1	23/12/18	NAS/AJP	DRAFT PLAN OF SUBDIVISION

Design NAS	Chk'd JN	Cad File	1805D.dwg
Drawn AJP	Chk'd NAS/JN	Plot Date	12/18/23
Scale 0 10 20 50m, 1:1000		References	
APPROVALS		Field Notes	

Bell ☐ Hydro ☐ Gas ☐ Cable ☐ Traf. ☐ Water ☐

LICENSED PROFESSIONAL ENGINEER N. A. SYLVESTER 100199487 DEC 18 2023 PROVINCE OF ONTARIO

Consultant

TRAFALGAR ENGINEERING
#1-481 MORDEN ROAD, OAKVILLE, ON, L6K 3W6
www.trafalgareng.com

Municipality

OAKVILLE Halton REGION

Title

ARGO NEYAGAWA
NEYAGAWA BLVD./BURNHAMTHORPE RD W
ARGO NEYAGAWA CORPORATION
TYPICAL ROAD CROSS–SECTIONS

Municipal No.	Regional No.
–	–
Contract No. –	Consultant No. 1805
	Sheet DRAWING 8

20M–

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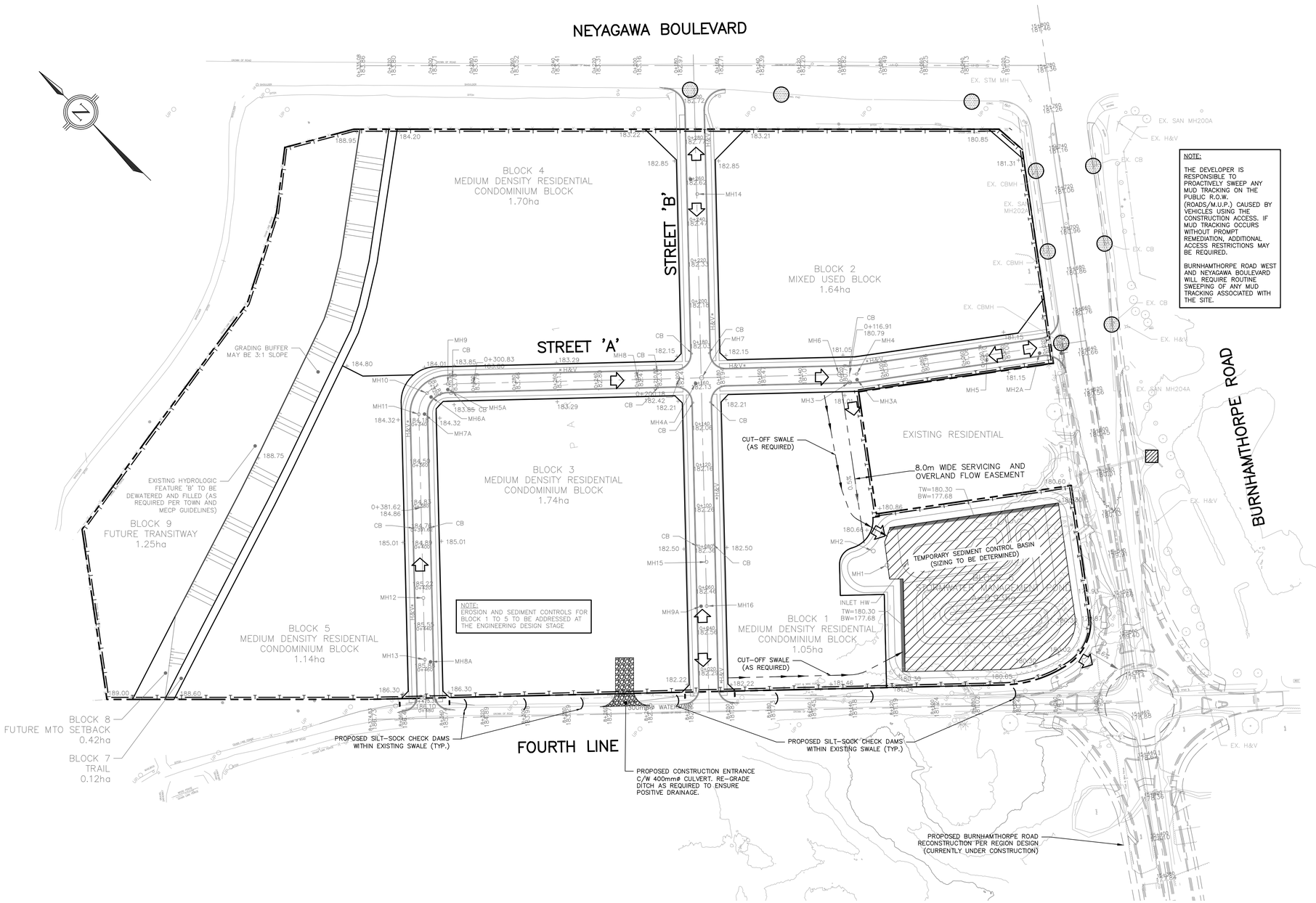
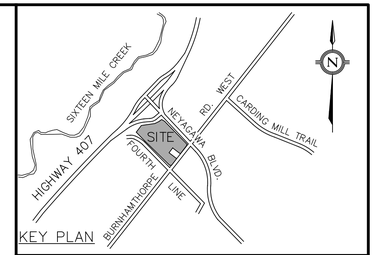


NOTE:

THE DEVELOPER IS RESPONSIBLE TO PROACTIVELY SWEEP ANY MUD TRACKING ON THE PUBLIC R.O.W. (ROADS/M.U.P.) CAUSED BY VEHICLES USING THE CONSTRUCTION ACCESS. IF MUD TRACKING OCCURS WITHOUT PROMPT REMEDIATION, ADDITIONAL ACCESS RESTRICTIONS MAY BE REQUIRED.

BURNHAMTHORPE ROAD WEST AND NEYAGAWA BOULEVARD WILL REQUIRE ROUTINE SWEEPING OF ANY MUD TRACKING ASSOCIATED WITH THE SITE.



KEY PLAN

LEGEND

- PROPERTY LINE
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED SWALE DRAINAGE DIRECTION

EROSION AND SEDIMENT CONTROL LEGEND

- SEDIMENT CONTROL CB IN PAVED AREAS
- SEDIMENT CONTROL CB IN LANDSCAPED AREA
- SEDIMENT CONTROL TRENCH DRAIN
- SEDIMENT CONTROL FENCE
- MUD MAT
- SILT-SOCK CHECK DAM

BENCHMARK

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NOTE

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No	DD/MM/YY	By/DRN	REVISIONS
1	23/12/18	NAS/AJP	DRAFT PLAN OF SUBDIVISION

Design	NAS	Chk'd	JN
Drawn	AJP	Chk'd	NAS/JN
Scale	0 10 20 50m, 1:1000		
APPROVALS			

Cad File: 1805E.dwg
Plot Date: 12/18/23
References
Field Notes

Bell ☐ Hydro ☐
Gas ☐ Cable ☐
Traf. ☐ Water ☐

LICENSED PROFESSIONAL ENGINEER
N. A. SYLVESTER
100199487
DEC 18 2023
PROVINCE OF ONTARIO

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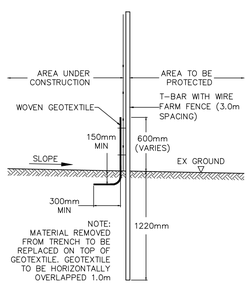
Municipality
OAKVILLE
Halton REGION

Title
ARGO NEYAGAWA
NEYAGAWA BLVD./BURNHAMTHORPE RD W
ARGO NEYAGAWA CORPORATION
CONCEPTUAL EROSION AND SEDIMENT CONTROL PLAN

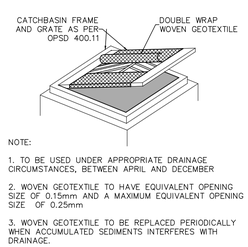
Municipal No.	Regional No.
–	–
Contract No.	Consultant No.
–	1805

Sheet: DRAWING 9

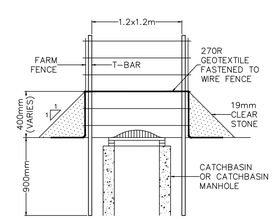
20M–



SEDIMENTATION CONTROL FENCE
NTS



CATCHBASIN SEDIMENT CONTROL IN PAVED AREAS
NTS



CATCHBASIN SEDIMENT CONTROL OFF ROAD AREAS
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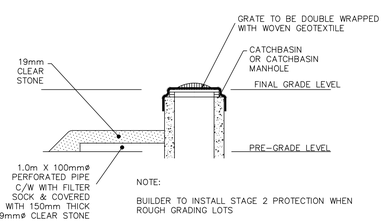
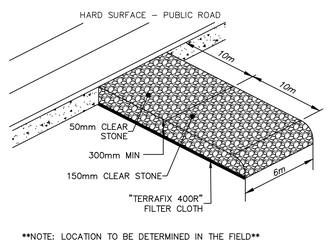


CATCHBASIN SEDIMENT CONTROL OFF ROAD AREAS
N.T.S.



NOTE: LOCATION TO BE DETERMINED IN THE FIELD

GRAVEL ACCESS PAD (MUD MAT)
NTS

FILENAME: P:\1805 Argo Neyagawa\04-CAD\03-DPS\1805E.dwg
PLOTDATE: Dec 18, 2023 - 2:29pm